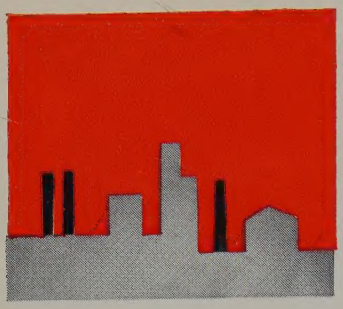
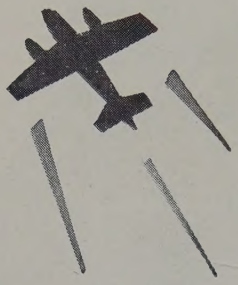
APRIL 1957

Skyways

OFFICIAL PUBLICATION OF THE NATIONAL BUSINESS AIRCRAFT ASSOCIATION

- NEDA Plan for Business Aircraft
- ROUND TABLE: Business Aviation Evaluates Jet Aircraft
- The "Black Hole"
- Get the Full Treatment





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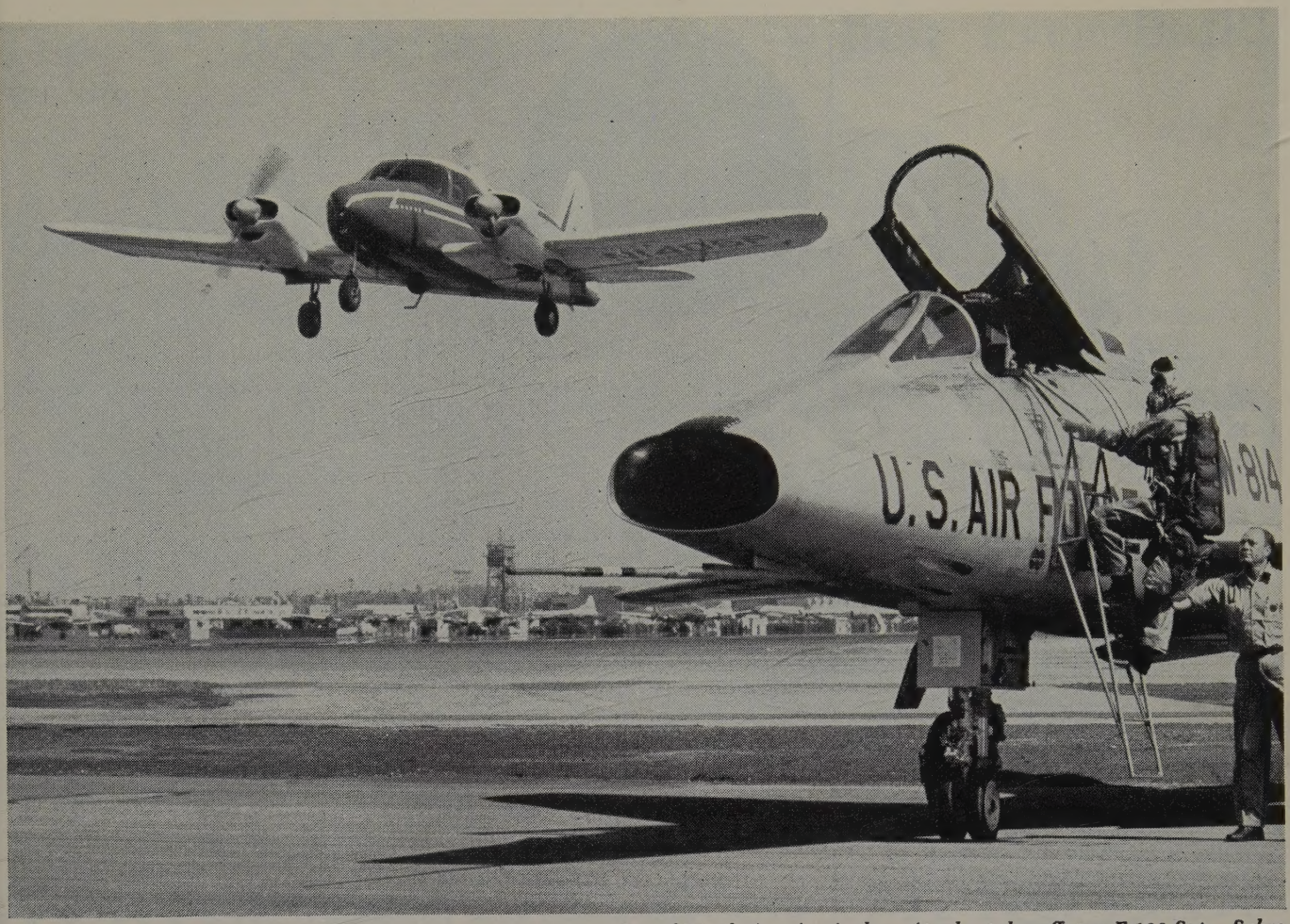

One of North American's three Apaches takes off over F-100 Super Sabre

PIPER APACHES HELP SPEED F-100 SUPER SABRE PRODUCTION

To meet their requirements for fast, economical, interplant transportation, North American Aviation, Inc., world's largest builder of military airplanes, chose the twin engine Apache built by Piper, world's largest manufacturer of civilian aircraft.

Before the Apache was chosen, an evaluation of all available twin engine aircraft was made for the company's special transportation needs by three separate groups at North American. The Chief Engineering Test Pilot studied flight characteristics, engineering features and structural integrity; the Chief Transport Pilot evaluated utility; the General Supervisor of Flight Test checked all-around performance and maintenance.

As a result of these three separate evaluations it was concluded that the Piper Apache was the best airplane to fill this specific transportation requirement at lowest cost with no compromise in quality, structural integrity, flight characteristics and performance.

Since selecting the Apache a year ago, North American Aviation's fleet of three Apaches has flown over 2,400 hours—30 per cent on IFR flight plan. The Apache has far surpassed North American's expectations.

APRIL, 1957

Skyways FOR BUSINESS

The official publication of the National Business Aircraft Association

COVER: Participants in SKYWAYS' Jet Round Table, held at the site of the USAF-NBAA Jet Symposium. Standing, left to right, W. B. Carrell, J. W. Hale, J. S. Herman, Lt. Col. T. M. Love, Steve Brown, Wm. K. Lawton, Maj. S. C. White, J. F. Coleman, A. S. Odevseff, and N. C. Beuter. Seated left to right: R. M. Harmon, Robert Snow, T. A. Davis, W. C. Pague, M. J. Gorden, D. M. Teel and D. F. Jamison.

FOUNDED BY J. FRED HENRY, 1942
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Karl Hess—Fuels & Oils
Herbert O. Fisher—Flight Evaluations

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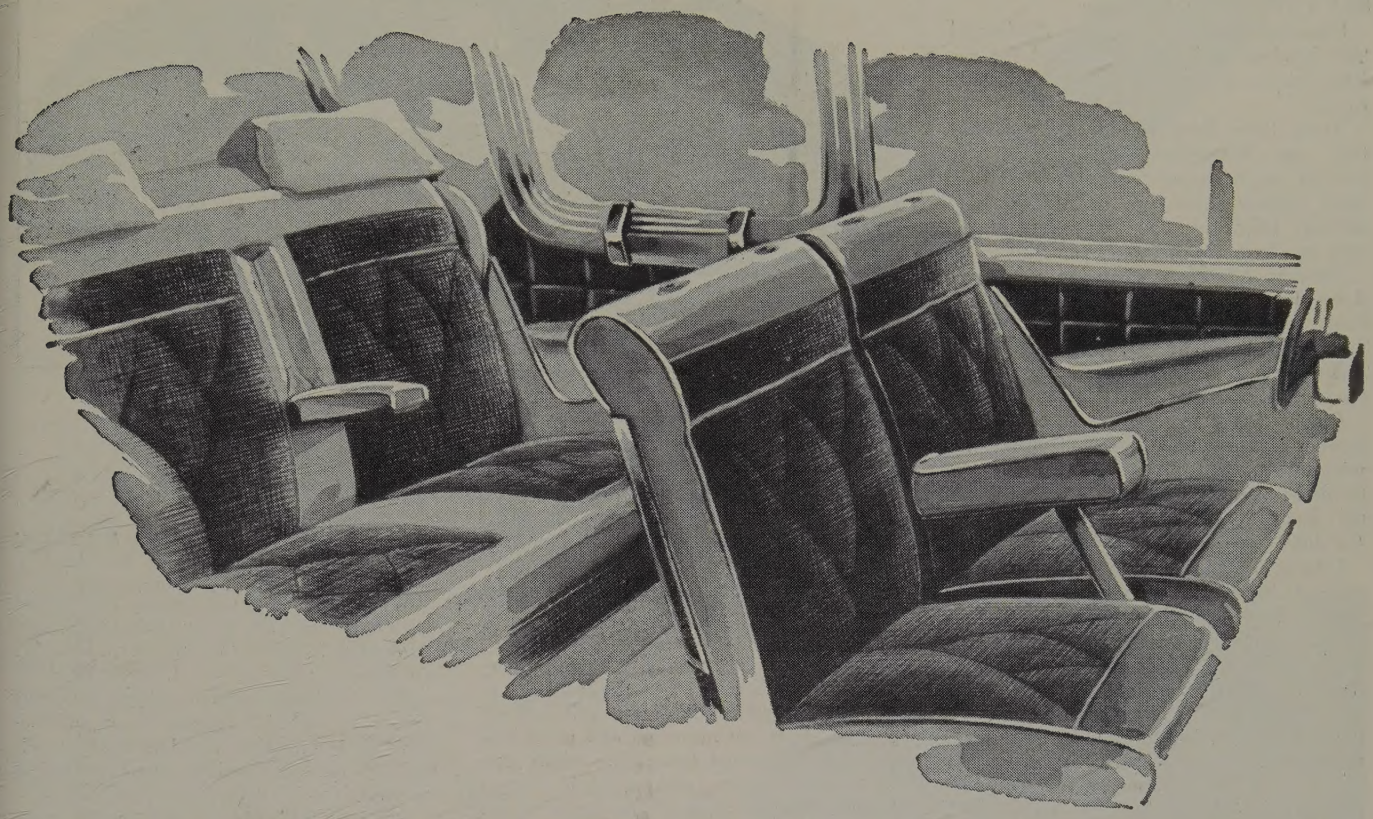
ADVERTISING OFFICE, 122 E. 42nd St., New York 17, N.Y. Tel. MU 2-9138
MIDWEST—Richard P. McClanahan, 333 No. Michigan Ave., Chicago 1, Ill. Tel. DEarborn 2-0196
WEST COAST—Boyd B. Garrigan, 5478 Wilshire Blvd., Los Angeles 36, Cal. Tel. WE 8-4411

BPA
Member Business Publications Audit of Circulation, Inc.

VOLUME 16, NUMBER 4

SKYWAYS is published monthly by Henry Publishing Co., Emmett Street, Bristol, Conn.; Editorial and Executive Offices; 122 East 42nd Street, New York 17, N. Y. Printed in the U. S. A. Single copy; 50c. Subscription Prices. U. S. Possessions, Canada and Pan Am. Union, $9.00 for 3 years, $7.00 for 2 years, $4.00 for 1 year; all other countries add $1.50 per year for postage. Please give title, position and company connection when subscribing. Six weeks required for address changes (give both old and new). Manuscripts, drawings, other material must be accompanied by stamped, self-addressed envelope. SKYWAYS is not responsible for unsolicited materials. Accepted as controlled circulation publication at Bristol, Conn.

The '57 Beechcraft Bonanza — Best Ever Built!



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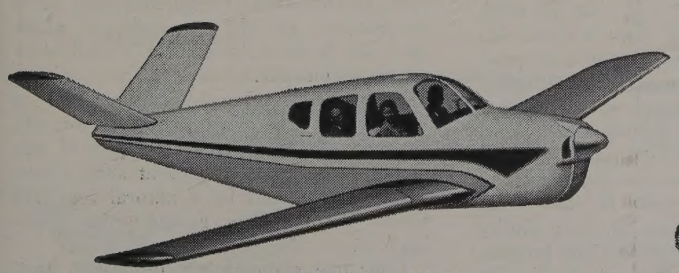
More Power ★ More Speed ★ More Beauty ★ More Comfort ★ More Safety

A new 240-horsepower engine provides speeds up to *206* miles per hour! The Beechcraft Bonanza is still the *quietest* airplane in the skies. Select your own restful interior from more than three thousand color and fabric combinations.

No airplane is *easier* to fly — no airplane can match the scores of exclusives in the new, four-place Beechcraft Bonanza for '57. Here is Beechcraft's *"More Comfort Flight"* at its very best!

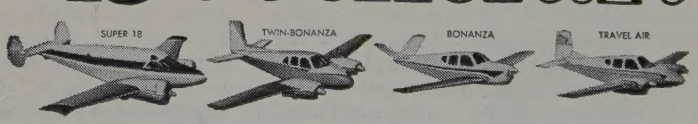
See your Beechcraft distributor or dealer today — and see the airplane that will do *more* for *you* than any other. *Your comparison is welcomed.*

Ask about Beechcraft's finance programs — there's one designed for you!



The BEECHCRAFT Bonanza
Flying 4 persons as far as 1,170 miles
at speeds up to 206 miles-per-hour.

Beechcraft



BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

AIR YOUR VIEWS

COMMON SENSE MAKES SAFETY

Mr. Ralph Piper
SKYWAYS Safety Exchange

I enclose a report [see *Safety Exchange*] that involves a flagrant disregard for our Regulations, as well as for common-sense rules.

Along these lines I may say that some time ago Bethlehem Steel's plane was cleared to Allentown range at 3000' and upon getting there was nearly hit by a military DC-3 going in and out of clouds with no clearance or radio contact.

Another Allentown case was a Military A-26 that made 2 instrument misses because he went down the SW leg instead of taking a heading of 193°—he made it the 3rd time with his one engine stopping on the taxiway because of no gas!

On p. 37 of the Feb. issue you have another military case of not doing what they were told to do, and the Air Force answer to the Midland disaster proves that they do not know what our Air Regulations are (or don't they care?)

I have owned 3 business planes in the past. At present I do not have one, but when I do I will join NBAA, as I believe you are sincere in having our air space available for all. I hope you will encourage all civil pilots to report violations. Surely, those flying fast or large planes should be the last ones to ignore regulations or common sense.

Donald V. N. Conover
Somerville, N.J.

P.S. In regard to #1 of "John Doe" [SKYWAYS Feb. p. 26]: I too think the ADIZ is ridiculous—surely Russia won't bomb us with a Tri-Pacer (I can carry more bombs in my station wagon). I firmly believe they have the ADIZ merely to try and trap a "Flying Saucer".

Mr. Donald V. N. Conover

I wish to thank you for your contributions and comments to the Safety Exchange of our SKYWAYS magazine.

Your letter and its wealth of printable matter will be used in an early issue of SKYWAYS for the benefit of other readers. We hope you can help us and other pilots by encouraging others to write in similar letters. We can handle many more per month. I am convinced there is a great deal of good that can come from such an exchange of information.

Ralph E. Piper
Monsanto Chem. Co.
Safety Exchange

PILOTS JUST FADE AWAY

Mr. William K. Lawton
Executive Director, NBAA
Dear Mr. Lawton:

Your exchange of correspondence with my colleague Eugene Marlin at Patrick Henry Airport intrigues me on several counts; first, because Gene belabors an issue I've been attacking for years—that is, the reluctance of in-bound pilots to provide any notice of intent or desire; second, that NBAA at long last recognizes that the airport manager *has* a side to the story—any story; and third, it gives me a chance to expound my theory that successful, satisfactory service is made, not born.

It has been our experience here at Arizona's airport that most pilots, once they descend from the airport, are reasonable, understanding people who do not expect miracles to be performed. In fact, they are frequently so amiable that they credit us with powers of clairvoyance, and so they become inarticulate. Our problem becomes that of extracting information, and in the absence of corpus/corpora, to guess, and guess right, by golly! Even though we try to meet 'em and greet 'em, you'd be surprised how many pilots just fade away before making their wishes known. Where are they? In the restroom, restaurant, CAA/WB, U-Drive office, or did that blonde in the Jaguar.....?

After all, an airport is nothing more than a service station for aircraft, and while the size of the facilities and the needs of the customers may vary all the way from corner-grocery-with-a-gas-pump to super-bus-and-truck-terminal, the success of the operation is a mutual responsibility.

No matter how capable, willing or enthusiastic, the best an airport (be it the management or the aircraft service operator) can do is no better than the attitude and respect of the problems displayed by the customer.

It is my belief that many pilots have become so resigned to inferior service that they expect it, accept it, do or say little if anything except to sound off—usually to someone who can't do anything about it, or who won't. Now, a recognition of the fact that forwarned is forearmed should make for better service. If the customer lets us know what he wants as far in advance as practicable, we've precious little excuse for not serving him to the very best of our ability—it may not be good, but it will be better than without his expressed consciousness of our existence!

Fortunately, more pilots do recognize this fact, and I am happy to report that there is a steadily increasing effort, however slow, on the part of pilots who do have special requirements or needs to phone, wire, or even write to state those needs and/or to inquire into our ability to meet them. But, as Friend Gene implies, we all could do a better job with more information, not only in advance but after rolling up to the ramp.

R. W. F. Schmidt, AAE
Tucson Airport Auth.

AYES TO THE NATIONAL CIVIL AIR SHOW

To the Editor:

We have read your editorial, "A National Civil Air Show?", in the Feb. issue, and agree that it is time to organize a business air show.

We at Cessna commend you on your efforts to organize such a show and believe it is one that the business aircraft industry should combine their efforts to sponsor.

Why wouldn't it be possible to turn over the organization of such a show to a professional exposition firm? It may result in a somewhat higher initial cost, but we think that the show could be organized more rapidly and effciently to achieve the end result.

We certainly want to participate and would welcome the opportunity to hear from other members of the business aircraft industry.

Bill Robinson
Cessna Aircraft Co.

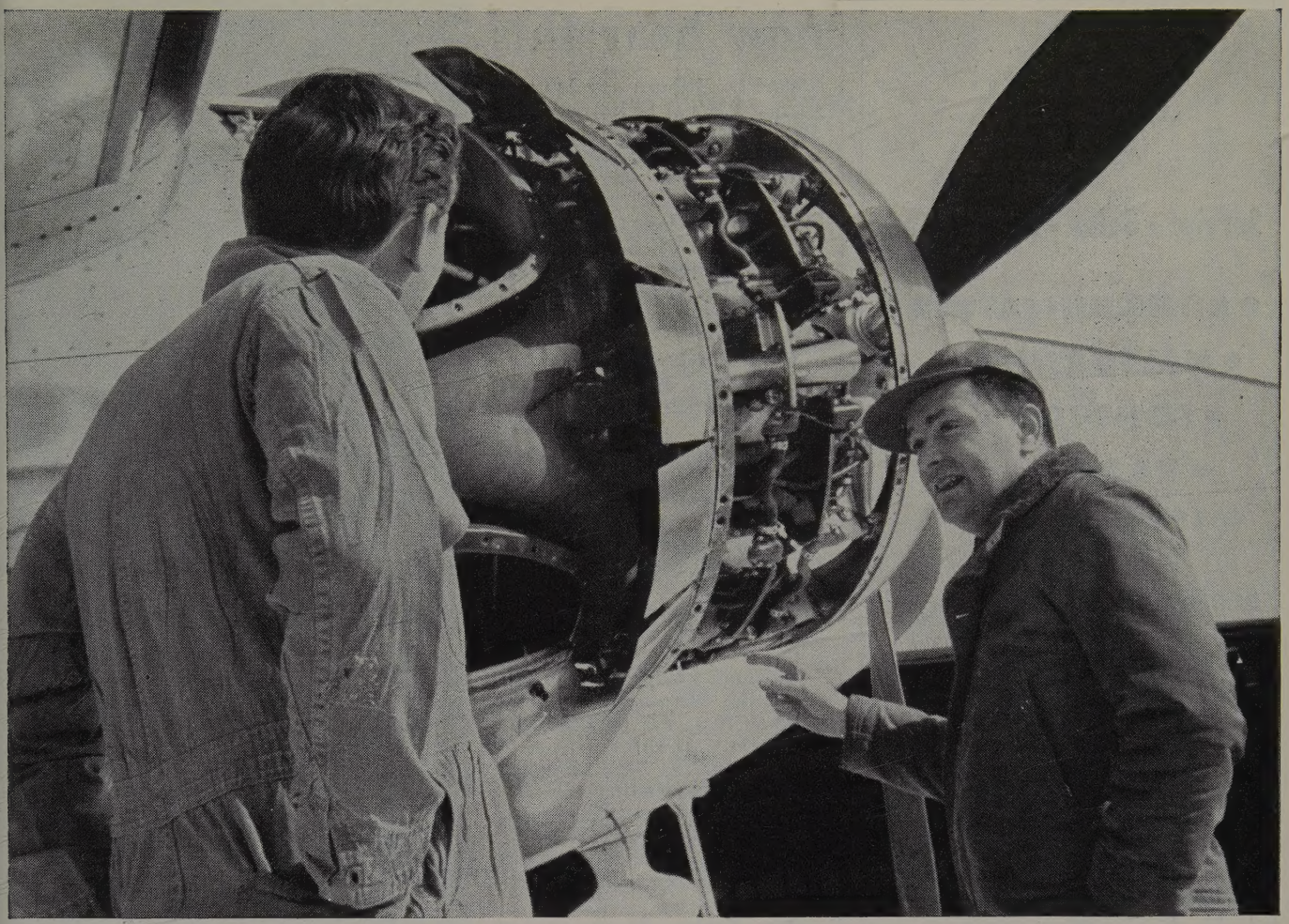
To the Editor:

I was much interested in your editorial in the Feb. issue of SKYWAYS entitled "National Civil Air Show?" Having been connected with the Henderson Bros. in their National Air Races, having served in their operational dept. and holding the official title of "starter", I believe I am sufficiently informed to say that I think your editorial is timely and would present a tremendous pulse to the civil side of our national aviation program. I have always felt that our national foundations, such as the Ford, Rockefeller and other foundations, are the organizations which have the finances to sponsor a civil show of this magnitude.

Your editorial should cause a lot of interest and I certainly trust that you will be successful in getting the ears of one of our large cities to present such a program. This should be a natural for Fred Crawford and Ben Franklin in Cleveland, O.

I for one am certainly interested. Incidentally, don't forget to include the rapidly-growing OX5 Club of America.

J. Earl Steinhauer
Fairchild Aircraft



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now hear this...

Earl D. Hilburn and **John M. Hunt** are new V.P.'s of Link Aviation, Binghamton, N.Y. Hilburn is in charge of W. Coast Div., Hunt has new post of Tech. Director.

Wm. B. Davis was appointed Deputy Administrator, CAA; prior he was Dir. of Flight Operations Office (Av. Safety Office) since 1955.

D. F. Johnson, Pres. of Aircraft Engrg. & Maint. Co., Oakland, is new Chmn. of Bd. of Governors of The Aircraft Service Assn.

Hans Weichsel is new Mgr. of Contracts and **Jos. Mashman** is new Dir. of Sls. Planning for Bell Helicopter Corp., Ft. Worth.

V. E. Larimer and **John M. Erskine** were elected V.P.'s of the N.Y. and Boston divs. of Atlantic Aviation Corp., Wilmington.

Lowell Lawrence joined AiResearch Div. of Garrett Corp., L.A., as asst. to Chas. Knox, Contract Administration head.

John R. Church is new Dir. of Aviation Sls. for AC Spark Plug Div., G. M. Corp.

T. Hamil Reidy, founder of Helicopter Air Service was named Chmn. of Bd. and Treas. of Skymotive Inc., Chicago.

Dwight C. Hornberger is new Mgr. of Export Admin. at Beech Aircraft; **W. F. (Wally) Balzerick** is new Sls. Prom. Mgr. for Beech Commercial Sls. Dept.

Paul E. Horlacher is new W. Coast Rep. for Montrose Div. of Bendix Av. Corp. **Edw. M. Crowley** is Montrose Prod. Sls. Mgr.

Roy Keeley, 38 yr. av. vet., was selected to direct CAA Office of Flight Operations & Airworthiness.

Charles E. Arnold is new Mgr. of Sylvania's Avionics Lab. **Frederick J. Anderson** is new Asst. Mgr.

Adm. S. S. Bowling is new Dir. of Communications for Slick Airways.

Dana P. Kelly is new Dir. of Pub. Rel. for Flying Tiger Line, N.Y. **M. N. Costa** is Asst. to Contract Sls. V.P.

Lee Richmond is Steward-Davis' new Calif. Sls. Rep. for Overhaul; **Ted Whaley** is new Western U.S. and Canada Rep.

Paul T. Cullen is new Pres. & Gen. Mgr. of Sperry Gyroscope Co., N.Y.

Howard Aero., San Antonio, has total sls. of $5,286,000 during '56, representing 12 mos. operations of Service Div. and 8 mos. sls. of Super Venturas. For '57 Howard has firm commitments for 10 Super Venturas. Dollar volume believed largest in exclusively exec. aircraft operation.

Lear, Inc., opened a New England office in W. Hartford, Conn. John Vlad is Mgr.

Axelson Mfg. Co. has new Av. Div. under direction of E. D. Jackson for research & development of landing gear parts, etc. John McGraw is new Chief Engr., L. G. Martial is Sls. Dir.

Airwork Corp.'s Atlanta and Miami branches are new distributors for Bendix av. prods.

Champion Spark Plug Co. has a new Aviation Sls. Dept. Working with B. R. Maus, Av. Sls. Mgr., are J. E. Conner, R. L. Anderson, D. A. Hulett. E. G. Koehler and A. B. Orgain serve Western District; R. E. Blackman joins S. E. District; T. D. Allergretti joins N.E. Dist.

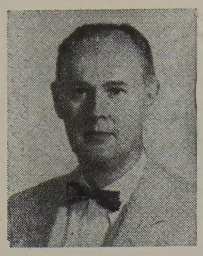
USAF F-104 Starfighter, the "Missile With a Man in It."

IF, AS YOU READ THIS, YOU SHOULD HEAR A LOCKHEED F—104 STARFIGHTER FLYING OVERHEAD, DON'T BOTHER TO LOOK FOR IT. THIS WORLD'S FASTEST JET WILL BE OUT OF SIGHT BEFORE YOU CAN FINISH READING THESE FEW WORDS.

LOCKHEED *means leadership*

LOCKHEED CALIFORNIA DIVISION: *Burbank, Bakersfield, Maywood and Palmdale, California*

JET FIGHTERS • JET TRAINERS • LUXURY AIRLINERS • PROPJET TRANSPORTS • AIRBORNE EARLY-WARNING AIRCRAFT • ANTI-SUBMARINE PATROL PLANES •



NBAA Director's Notes

Major airframe company, not now in civil aviation field, is seriously contemplating entry into business aircraft manufacture. Company thinking centers around turbo-props rather than jets as greater business flying market potential. 10-12 place, two-engine, 400 mile-per-hour cruise, pressurized for 30,000 feet, and requiring not more than 5,000 foot runway lengths . . . these are rough areas of this company's discussions with some NBAA members.

Look for changes in Traffic Control Procedures (ANC/PAT Manual) due for release in Apr. No major changes envisioned. Minor changes proposed would include revision of current "1000' on top" clearance to "VFR in top." This wording will make 3-mi. visibility automatically part of the on-top clearance and include the 1000' above clouds restriction. One major airline recently has adopted flight policy of maintaining at least 2000 above cloud layer when an "on-top" clearance is received from traffic control. Other airlines expected to follow suit.

DO SOMETHING DEPT.: Place: Washington National Airport. Scene: North end of airline ramp filled with assorted Connies, Diesel 6's, 240's, etc. Action: Inbound Viscount sitting on taxi strip for 10 min. waiting for gate to discharge passengers. Scene: South end of ramp. Seven gate spaces without a single airplane. Action: *NONE!*

Artificial vapor trails for VFR flight identification and quick sighting has been proposed by NBAA member. Device would put out chemical smoke trail with high visibility color, possibly with a phosphorescent glow for night operation. If enough favorable comments received from industry *(you)* some manufacturer could be encouraged to research and develop the item. Let's hear about it!

First concrete steps towards commercial radio telephone system between aircraft in flight and land telephone network were recently taken. FCC now has application of telephone companies for (1) frequency utilization Air-Ground system and (2) erection of experimental station towers. How close is this to realization? Well, the DC-8 and 707 are *not* installing public telephone booths.

Want facts and figures on business flying? Get CAA's 1960-1965-1970 Civil Aviation and Federal Airways Forecasts. Published by U. S. Dept. of Commerce; 75¢ per copy. Six pages of 70 are devoted to statistics, forecasts, and projected growth of business flying. Clearly shows business flying as greatest growth factor in *all* civil flying . . . *now* and *more* so in the *future.* Also gives airline, instruction. aerial applicators flying hours for comparison.

Air space crowded? CAB was forced to extend until Apr. 15 its regulation confining flight testing to areas approved by CAA. Why? An amalgam of warning areas, prohibited areas, danger areas, caution areas, civil airways, control zones, plus heavily populated areas have brought out the fact that free air space isn't so free.

West Coast aviation industry halted all test flying because suitable test space was not available. Busy Miami found a space . . . near Lake Okeechobee about 80 mi. N.W.!

New 5-place helicopter, the Alouette 11 designed and produced by Sud-Est Aviation, will be touring U.S. soon. Gas turbine engine developing 400 hp will give 1490 lb useful load and full tank, normal cruising range of 3 hr. 15 min. Republic Aviation is sponsoring U.S. tour of this French designed and produced "hel-i-co-peter."

Suite 344

On behalf of the Board of Directors and the Membership of NBAA, our most sincere appreciation for the outstanding program which was presented at Wright-Patterson AFB, Feb. 7 and 8 in connection with the USAF-NBAA Jet "Know How" Symposium. Especially our appreciation to Brig. Gen. Thomas L. Bryan, Jr., WADC; Lt. Gen. Thomas S. Power, ARDC; Lt. Col. Thomas Love, ARDC; Lt. Col. John Szymkowicz, WADC, and Maj. Stanley C. White, WADC.

The Board of Directors held their Board Meeting on Wed. evening, Feb. 6, at the Dayton Biltmore. On behalf of the Board, may we express our most sincere appreciation of ARMCO Steel's generous hospitality offered the members. Walt, you are a most delightful host.

Those members present: Joseph B. Burns, Exec. V. P.; Gerard J. Eger, Treas.; Henry W. Boggess; James Ketner; Cole H. Morrow; Walter C. Pague; Eugene T. Spetnagel; Robert C. Sprague, Jr.; and Curt G. Talbot. Because of weather conditions, Ralph Piper appeared just two hours late. Jim Magnus, Mpls. Honeywell, was also present, representing the Minn. Business Aircraft Assn.

Capital Chapter, National Secretaries Assoc. (International), Wash., D. C., of which Yours Truly is a member, held their 5th Annual "Boss Night" on Mon. Feb. 11. Bill Lawton and Dick Groux were among the many Bosses and their gal "Friday." The nautical theme "Southern Cruise-Last Night Out Party" was enjoyed by all.

U.S. Steel's own Don Teel was asked to submit a short biog as participant on the SKYWAYS Round Table on Saturday following the Symposium. Don jotted down the figure "1908" and was at a loss as to what had happened since. Don, have you found out?

Mailings for February: CAA FORECAST—BUSINESS FLYING—1960-1965-1970; RADAR WEATHER ADVISORY SERVICE — 133.2 Mcs., Amended By-Laws.

At the Feb. Board Meeting, Cole Morrow was elected Chairman of the Technical Comm.; Ralph Piper, Chairman of the Awards Comm.; Walter C. Pague, Chairman of Forum Comm.; Henry W. Boggess, Chairman of Public Relations Comm.; Curt Talbot, Chairman of Nominating Comm.

Larry Mansfield, Miami Convention Bureau, visited Headquarters, and Miami again welcomes another NBAA Annual Meeting. James Herrick, Fleet Sales Research Rep., Cessna Aircraft, also visited us.

"Chuck" McKinnon, Mgr. Flight Operations, IBM, has been selected to represent NBAA on the Society of Automotive Engineers Committee (SAE-57) on Cockpit Standardization.

"C. M."

NBAA Membership

Information regarding regular or Associate Membership in the National Business Aircraft Association is readily secured by writing to the Executive Director and Secretary of NBAA at 344 Pennsylvania Building, Washington 4, D.C.

Membership in this non-profit and independent aviation organization is based on the recognition of business flying problems common to all users of aircraft for their business purposes and to those engaged in supporting the operation, servicing, equipment, and manufacture of business aircraft.

Among the fields in which NBAA is concerned are: improvements in airways and airports, better weather service, expansion in communications and air navigation facilities, higher standards of airport services, improved aircraft parts distribution, equitable tax rulings for business aircraft operations, greater recognition of the airplane as a necessary tool in modern business and industry, better air traffic control procedures, professional status for qualified business pilots, and aircraft designed to meet the special requirements of business flying.

The "BLACK HOLE"

By Arthur E. Jenks, Chief, Flight Inspection Div., CAA

The primary purpose in the preparation of this paper is to highlight in one document the visual portion of the approach and landing of aircraft under low visibility conditions. To this end, an attempt has been made to state the problem in its various components, and to propose a method of solution that is compatible with the limitations of the human eye. The latter is the key, and simplicity is the order of the day, especially when you consider that the operational application of this discussion takes place in 10-15 sec.

Before any analysis of a specific portion of the over-all problem can be determined, certain assumptions are necessary to stabilize or neutralize the remaining factors of the over-all problem. This discussion is directed to the visual portion of the problem and it is assumed that the factors of stability, speed, drag configuration of the aircraft, attitude and all the other factors pertaining to a successful approach and landing are satisfactory or under control.

The basic requirements for visual flight in the approach zone are:

A. Identification.
B. Alignment.
C. Roll Guidance.
D. Height Guidance.
E. Distance.
F. Positive Threshold Definition.

These elements must be presented with simplicity, requiring no interpretation, and must be obtainable instantly. Under lower visibility conditions, the time element is critical and will not permit of any signal other than a positive and instantaneous rendition of the required element.

After passage of runway threshold, the requirements for visual flight for flare, touchdown, and landing roll are:

A. Identification.
B. Alignment.
C. Adequate definition of runway surface. (Precise height sensitivity.)
D. Roll Guidance.
E. Distance.

The requirements for visual flight over and onto the runway are in many respects similar to the approach requirements, although differing in order of priority and with strong emphasis on precise height sensitivity.

At present the visual information changes abruptly at the threshold and becomes inadequate and in many cases entirely absent. The main reason is that with good approach lighting containing the required elements for visual flight, the abrupt change at the runway threshold to the outline of the runway geometric pattern affords no continuity of the elements previously present.

It has been established that visual flight can be maintained on an acceptable approach light pattern with a minimum visual segment that is the equivalent of 3 sec. of time at the aircraft's forward velocity. At an approach speed of 140 knots this would be the equivalent of a 700′ visual segment ahead of the aircraft. It has also been established that difficulty is experienced on the runway *in landing* if the visual segment ahead of the aircraft is less than 1400 to 1900′, dependent on the runway width. This indicates that while the minimum segment of 3 sec. will suffice in the approach zone, the requirement increases to 6-9 sec. over the runway for the principal reason that there is no continuity of the visual intelligence, obtainable in the approach zone, onto the runway.

Table 1.

Angular Vision required to encompass both sides of a runway at different Runway Visual Ranges:

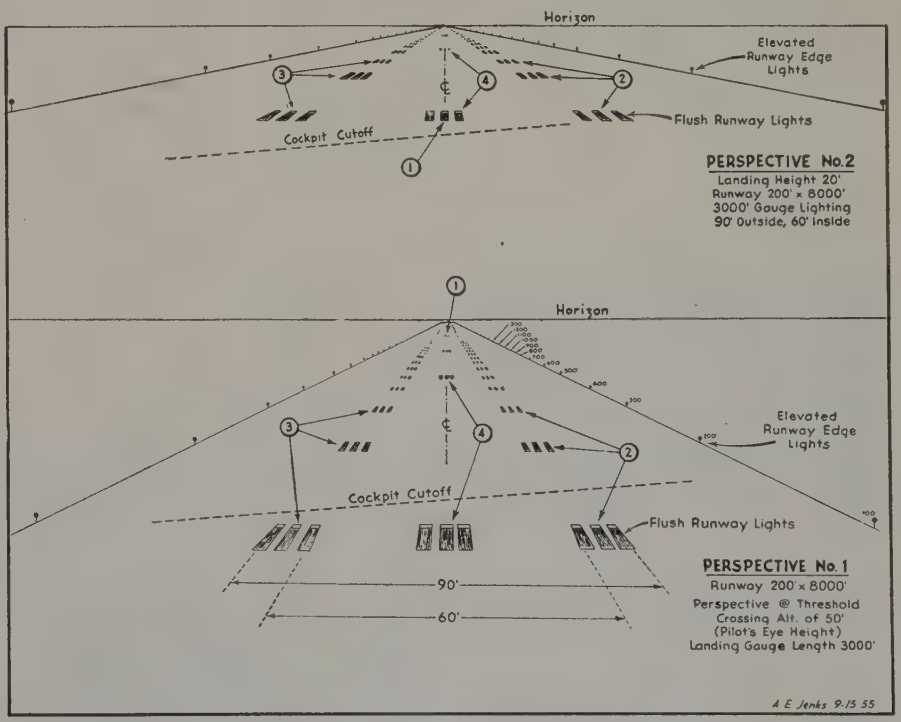
RVR	200′ runway	150′ runway
2500	4.6°	3.43°
2000	5.75°	4.3°
1500	7.6°	5.73°
1000	11.3°	8.53°

Basic Runway Visual Aid Requirements—Any theory of adding extra guidance elements to the visual aids pattern, particularly those that require pilot interpretation, should be screened carefully. The principal reason for pilots not accepting the slope-line system was its requirement for interpretation. The visual aids system should be considered only as requiring three basic units for instinctive interpretation: (1) Approach, (2) Threshold, (3) Landing Mat. Instinctive interpretation means that these three units should be treated in such contrasting fashion that, at no time, could one be mistaken for the other two whether visible or not.

Even the introduction of distance information should be very sparingly used in order that progressive reaction of the pilot's mind will be left free to keep ahead of the airplane on approach and landing, using the visual aid guidance elements of height, roll and direction instinctively.

Height Guidance—At present this is derived from several sources, and at best is an indirect geometric perspective reading that the pilot has learned, through experience, to use as

(Continued on page 34)



PROPOSED *narrow gauge flush all-weather runway lighting. Numbers indicate 1: Identification/Alignment, obtained from negative center line; 2: Roll Guildance—flush units provide Linear Bar effect and transfer essential horizon indication in the area where it can be used. Individual bars spaced to provide continuity in precipitation; 3: Height Gauge; 4: Distance—additional center lines bars are spaced 500′ apart.*

AVIATION *Forecaster John Selsmer, of the San Francisco Weather Bureau, points out the new pilot briefing setup to Capt. Ed Gough and Copilot Charlie Johnson of Bay Aviation Assoc. Gough flies a modified B-25 with wingtip tanks and Jato on Charter service. "I wouldn't take off without a full weather briefing," he says, "any more than I would take off without a full mag check."*

Get the full treatment

By Capt. Chuck Banfe

(Ben Franklin might have said it, "Some pilots take off weatherwise; some take off otherwise.") Some things in our daily lives appear so self-evident that it surprises us just a little that a significant proportion of the flying public seems either unaware or indifferent to a recent program that provides a more complete and more expeditious briefing service.

The phone rings.

A forecaster in the Weather Bureau at San Francisco airport answers it.

"What's the weather in Portland and the latest here?" the man asks.

The forecaster checks the hourly sequences.

"Clear and unlimited in Portland, same as here in the Bay area."

Five hours later the pilot lands in Portland, white-haired and shaken-up from having barely squeaked through the severe turbulence of a squall line and heavy icing in an occluded front. He proceeds to castigate the Weather Bureau. When asked if he had informed the forecaster he was a pilot and wanted a pilot briefing, he said he "assumed" the weather forecaster was aware of that.

Belatedly he then learned that weather forecasting facilities are available to anyone who calls—skiers, kite fliers, movers, or petunia garden-show judges. The Weather Bureau does not interrogate callers, for the phone is "alive" all day long; they simply present the weather requested.

"I wonder how many of those I have told it was turtle-neck sweater weather at Squaw Valley were pilots and considered that an adequate terminal forecast?" says Clarence Smalley of San Francisco's weather office. "I probably answer 50 phone requests a day for weather besides pilot briefings, and unless a man tells me *why* he wants the weather, I don't know if he is planning a picnic or a trip and, if it is a trip, he could be going by Bonanza, station wagon or covered wagon."

"When a pilot calls us on the phone he should identify himself and give:

1. Destination
2. Route
3. Time of Departure
4. Flight Time
5. Altitude
6. VFR or IFR
7. Type of aircraft

"Time of departure is important to us," says forecaster Blaine Ramsden. "Far too often I have phone-briefed a pilot, spent ten minutes going over the weather picture, only to discover that the pilot was planning a flight the next day! If I had known that I could have given him all of the pertinent information in two minutes."

Only under certain limited conditions do most professional pilots agree a telephone briefing can be used.

"A flight less than 300 miles and good VFR conditions enroute are my requirements," says corporate pilot George Scott of Bay Aviation Associates in San Francisco. "If I have those two items then I consider a 'Don Ameche' briefing good enough; but give me shaky terminals or IFR conditions possible enroute and I go for the *full treatment!*"

Some pilots skip direct Weather Bureau briefing because of what seems to them to be a long discourse on weather, however; such behind-the-scenes information may be just what the doctor ordered when the enroute weather takes a quick-180 and changes into a nightmare. The pilot is then able to do some fast inflight forecasting on his own.

A few pilots complain that the Weather Bureau goofs too often. Although it is true that Meteorology is still one of the junior sciences and its accuracy *is* subject to the whims of many unknowns, its batting average is enviable. It's easy to remember the times the forecaster missed the boat, but few recall how many times the Weather Bureau pin-pointed the weather.

In the last few years the USAF conducted a survey and here were the results:

Promptness and Efficiency of Weather Briefing 98% reported GOOD
Weather Forecasts
97% reported SATISFACTORY
Wind Forecast
95% reported ACCURATE
Landing Weather
99% reported ACCURATE

That adds up to a batting average of 97% for all factors of weather forecasting. This past year Mickey Mantle led both leagues in just about everything, and he would have given another torn ligament to have reached

(Continued on page 32)

New Idea in Big-Company Transportation

Cessna 310s—the ideal way to give your executive "comers" more time, more prestige—and a release from tension.

Cessna 310 "twins"—3 for the price of 1 converted transport—give new mobility, increased effectiveness to your next-to-top men!

That small, vital group of hard-driving men you "couldn't replace" — how to help them keep on driving hard, without driving themselves to a breakdown or out to greener pastures?

Fast, luxurious Cessna 310s in your executive air fleet will give these men more time . . . time to do an ever bigger job for you . . . more time with their families . . . and most importantly, time out from the gruelling tensions they're under.

These are benefits, you'll agree, far more important than money — yet you can buy three, or even four, Cessna 310s for the cost of a single converted heavy transport.

And 310s are faster than many transports, as well as significantly more versatile — afford small-field performance with big-plane safety.

1600 miles of travel, plus 2 hours' working time at destination, is a normal day's operation for the Cessna 310. It carries five people. Its speed, clean contours, and luxury appointments have made it the "glamour ship" of many executive fleets.

You can get the complete Cessna 310 story — and a demonstration — from your nearest Cessna dealer, listed in the Yellow Pages of your telephone book. Or contact CESSNA AIRCRAFT CO., DEPT. S-6, Wichita, Kansas.

(A Cessna 310 with all standard equipment is priced as low as $54,950 f.a.f. Wichita.)

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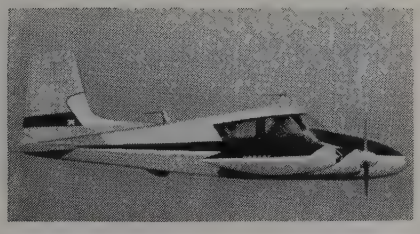
Inquire about Cessna Lease Plans

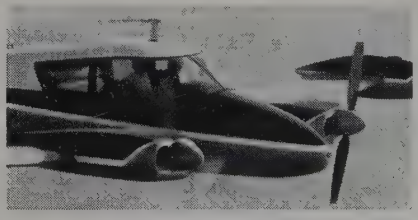


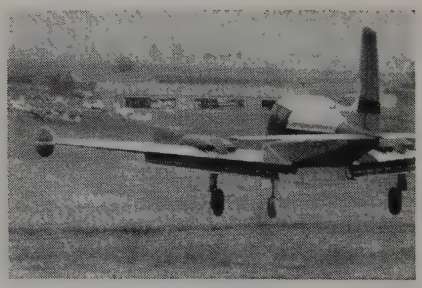
Cleaner

Years-ahead design and engineering: new, thin engine nacelles reduce drag, boost speed. Wing-tip safety tanks — allow more lift with less wing. "Airliner"-type tail gives exceptional low-speed stability.

Twin-engine safety

More power per pound of weight than any other business twin. Superior power-loading, acceleration, climb and speed. Quickly removable cowlings for easy maintenance.





More flexible

Small-field capabilities with big-plane comfort — Cessna 310s land shorter than many single-engine planes, take off from virtually any airport or strip. Operation costs are far less than heavy transports, too: 3 times as much mileage per gallon of fuel.

4 GREAT CESSNAS 172 180 182 310 THE COMPLETE AIR FLEET FOR EVERY BUSINESS NEED

SKYWAYS FLIGHT OPERATIONS ROUND TABLE

Business Aviation Evaluates Jet Aircraft

SKYWAYS Round Table #51 was held at Dayton, Ohio, after the conclusion of the Jet Know-How Symposium presented for NBAA by the Air Force to acquaint business aircraft operators with the characteristic problems of the jet age. The Round Table participants, representatives of jet manufacturers, prospective purchasers, fixed base operators, CAA, ATC and the Air Force, took this opportunity to review some of the key problems.

Walter C. Pague, Moderator, observed in his introductory remarks that the 15 yrs. experience acquired by the Air Force will be invaluable to operators of jet business aircraft. The critical flight regime and the cost of operational failures, he said, increased the importance of safety and operations standards.

In discussing the administrative aspects of the business jet age, these problems were considered:

- **How will one large corporation use their jet aircraft?**
  Steve Brown, Chief Pilot for Continental Can, **said, "We determined that we could operate an M-185 for about $1.05 a mile, comparable to the cost of operating a Lodestar."**

- **Can small companies justify the cost of jet operations?**
  Twenty minutes can be saved on a 500 mi. trip, with greater comfort for the executive, but at greater cost.

- **How do turboprop operating costs compare with similar piston aircraft?**
  Gardner (Vickers-Armstrong): **"The 4-engine turboprop and the twin-engine piston operation aren't poles apart."**

- **What are the physical requirements for crew and passengers of jets?**
  Compared with the youth of Air Force personnel, the age factor in business pilots and passengers must be considered more closely. "You must assume that you need a reliable cabin for pressurization," says *Dr. White (USAF).* "With reliable pressurization, an oxygen system would be for emergencies only."

- **Factors in pilot transition to jet flying?**
  Dr. White: **"Previous flying experience will decide how difficult transition will be."**
  Gardner: **"The airlines using Viscounts have had no pilot conversion problem."**

- **Flight planning for jets?**
  Col. Love (USAF): **"There is a premium on flight planning; it is a much more serious business than it was for propeller-driven aircraft."**

- **What are runway limitations on jets?**
  Pague (Armco Steel): **"In jet operation, on a hot day, it isn't a matter of going that day at all, but of waiting for the next day, because there isn't enough runway length for the aircraft to get off."**
  Gordon (Beech): **"The take-off distance for the MS 760 is comparable to current transport airplanes."**
  Gardner (Vickers-Armstrong): **"Runway requirements for the turboprop are no more than for comparable piston aircraft."**

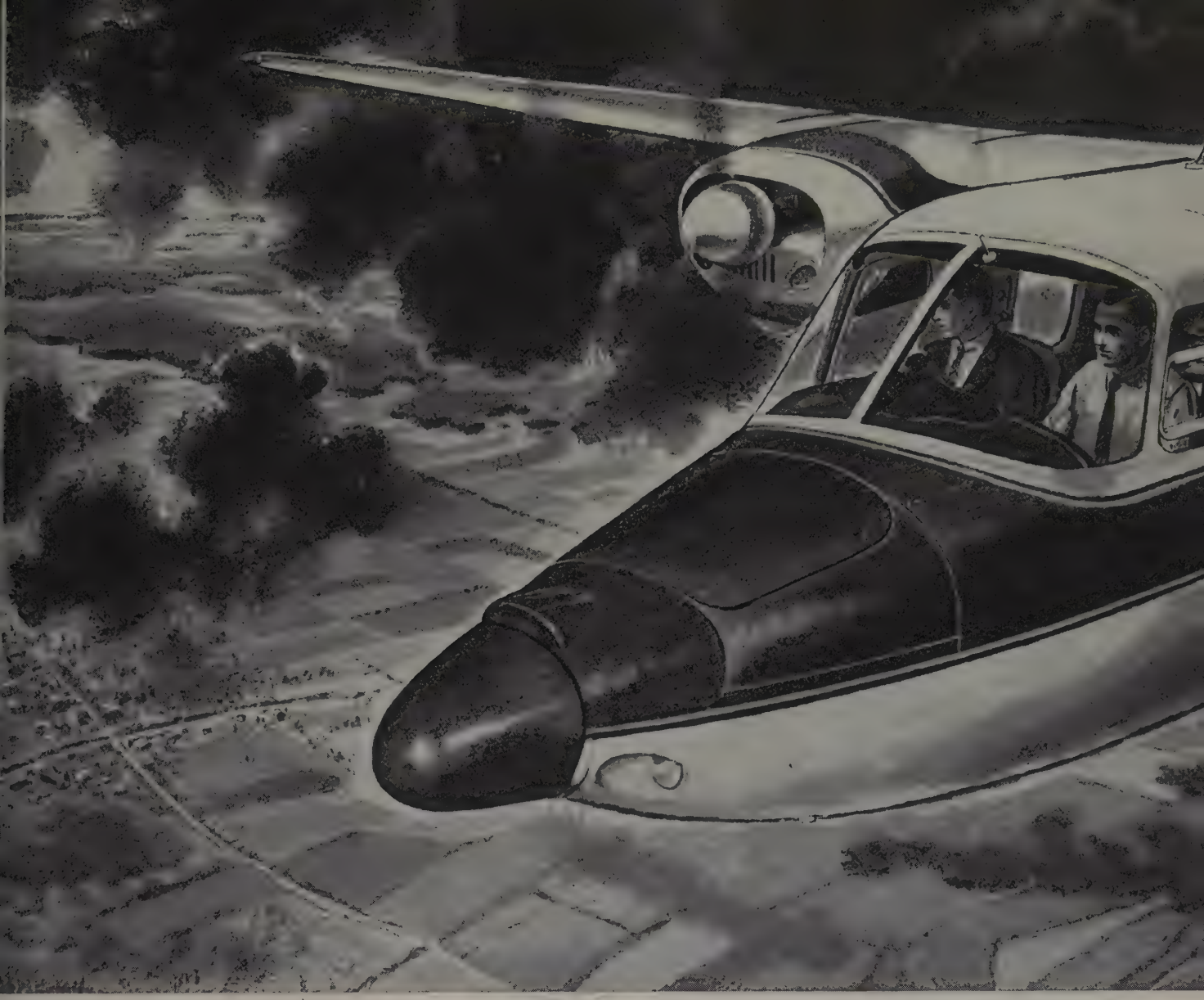
- **How are the maintenance aspects of jet operation being solved?**
  CAA is acquiring jet experience at the Oklahoma City training center. Because cost requirements for jet ground-service equipment are so high, the business jet must be self-sufficient.

DR. WHITE *discusses the physiological problems of hypoxia and decompression that might arise in high-altitude jet oper.*

COL. LOVE *pointed out that thorough knowledge of the laws of jet flight has given the Air Force a better safety record with jets than with piston-engine aircraft.*

Walt Pague: *"Skeets Coleman, will you start by telling of Fairchild's plans?"*

Coleman *(Fairchild):* "Thank you, Walt. The projected availability of gas turbine aircraft is approaching actual availability. Within the next year we'll see that business aircraft people



THE NOSE THAT KNOWS THE WEATHER

...and makes possible a faster, more comfortable trip!

That plastic "nose" you see encloses the business end of RCA's new weather avoidance radar (AVQ-50).

Specially developed for use in aircraft where weight, space and power are at a premium, the AVQ-50 is the latest addition to the RCA weather radar family.

It enables your pilot to pinpoint turbulent areas many miles ahead and choose a smooth path around them. In the words of a pilot, it makes it possible to do broken field running instead of long, time-wasting end runs. It is also good for ground-mapping.

In the interest of timesaving and more comfortable flying, you should investigate the AVQ-50 as applied to your aircraft.

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Custom Aviation Equipment 11819 W. Olympic Blvd., Los Angeles, Cal.

Tmk(s) ®

ROUND TABLE PARTICIPANTS

WALTER C. PAGUE, Moderator, has been Chief Pilot of Armco Steel since 1945, following service as Navy transport pilot during WW II.

NORMAN C. BEUTER, Chief of CAA's N.Y. ARTC Center, has served with CAA since 1938 as Controller, Chief Controller, Chief of ATC Section, and ATC Inspector at Washington, Pittsburgh, Anchorage, N.Y. Prior, 3 yrs. USAF radio operator, 8 yrs. American Airlines Flight Radio Operator, Station Mgr.

STEVE BROWN, Chief Pilot, Continental Can Co., served with AT Command in CBI theater during WW II; then joined CCC, set up its Av. Dept.

W. B. CARRELL, Exec. V.P. of Chamberlain Av. since 1950, served in Marine Corps. from 1940-46 as pilot and combat flight instructor.

J. F. (SKEETS) COLEMAN, Customer Relations Rep. for Fairchild Aircraft, is engaged in promoting the F-27 turboprop transport. He flew 91 missions with the Marines in the Pacific in WW II, served with Convair flight staff, received Harmon International Trophy (1955) as first successful pilot of the Navy XFY-1 "Pogo" turboprop VTO.

THOMAS A. DAVIS, Chief of General Safety Div., CAA Region I, joined CAA in 1939; prior to that spent four years in U.S.A.F.

CHARLES GARDNER is Manager of Information, Public Relations and Promotion for Vickers-Armstrongs, Ltd., whose Viscount was the first civil airliner with turboprop power.

M. J. GORDON, Chief of Preliminary Design and Aerodynamics for Beech; his dept. is responsible for creating all new Beech aircraft. A pilot since 1933, he has commercial and instrument ratings. Member of SAE, IAS, ARS.

JACK W. HALE, Vice Pres. and General Mgr. of Chamberlain Aviation, Akron, served previously with Ohio Aviation Co. (1945-54), Embry Riddle Co. (1940-45), 4 yrs. with USMACR at Opalocka, Fla.

RALPH M. HARMON, Chief Engr. of Business Transport Div., Cessna, has worked on 620 programs for 3½ yrs.; for the last 20 yrs. associated with the design and development of business aircraft.

JAMES S. HERMAN, Dayton representative for the Fairchild Engine Div., is a private pilot, has served in the AAF, ATC.

DAVID F. JAMISON, mgr. of GE's Aircraft Engine Unit, Central District, was marketing research mgr. and tech. liaison supervisor for Small Aircraft Engine and AGT Development Depts. of GE; prior, was aerodynamics engr. for Hamilton-Standard, Maintenance Engrg. Officer, USAF, and B-29 Flight Engr. Member of IAS, AHS, Air Force Assn.

LT. COL. THOMAS M. LOVE, USAF, is connected with ARDC, Baltimore, was Asst. Dir. of Aircraft, Maint., Engrg. & Supply, ADC. Flew P-80's in 1st Ftr. Grp., AF's first jet fighter unit; also P-59's, and P-51's with 8th AF During WW II.

A. S. ODEVSEFF, Mgr. of Military Engrg. for Beech, has served in various Beechcraft engineering departments since 1936.

ROBERT SNOW, Regional Sls. Mgr. for Continental Aviation & Engrg., served from 1943-46 with the WADC Armament Lab., was later buyer and sales engr. for various aircraft firms. He is an AHS member.

D. M. TEEL, Chief Pilot for U.S. Steel, started executive flying in 1934. Joined U.S. Air Corps in 1927, served 5 yrs. with RAF, 4½ yrs. as pilot and operations mgr. for Argentine Air Lines.

JOHN P. TURNER, JR., Central District Mgr. for GE Aviation & Defense sales, served previously with GE Aircraft Turbine Div., Turbine Section of Aircraft Accessory Div., and Small Aircraft Engine Dept.

MAJ. STANLEY C. WHITE, USAF, is Chief of Respiration Section, Physiology Branch of WADC Aeromedical Lab., has been active in aviation medicine since 1950.

have turned up plans to integrate not only turboprops but also straight gas turbines into their fleets. We could realistically say that by the end of '58 we will have as many as 10 fleets using turboprop aircraft, following at least 1½ yrs. of airline experience with this type. As far as the straight jet is concerned, we'll see, not only at Fairchild, but at other firms, a prototype flying in 1958 which will be tailored to business requirements. It's becoming more essential that the specifications fit the particular needs of business aviation, and each month more and more airframe manufacturers are consulting with the heads of these fleets on prototype and mock-up; I would say that by the end of '58, even without military backing, we'll see several prototypes flying, backed up by firm orders in the business fleets."

Pague: *"Steve Brown, what are your company's plans?"*

Brown *(Continental Can):* "It is known that we have ordered 3 M-185 4-engine straight-jet aircraft from Fairchild, and one F-27 turboprop. It was rather simple for us to conclude that straight jet or turboprop aircraft was the logical direction when considering the future needs of the company. We felt that the airline-type airplane of today is getting too large, psychologically and physically. About the smallest reciprocating-engine aircraft above 12,500 lb. in the field today is the Convair 440. We don't need a twin-engine plane as large as the 440. We have about 100 plants throughout the U.S., Canada and Cuba, which makes it almost impossible for us to justify the small twin-engine airplane with one pilot, because we are convinced that we need a crew of two to fly our executives. The executives go along with that. In the jet age there will be a place in our company for a small twin turbojet with a dependable autopilot.

"We wanted to control operating costs, which we felt was impossible with the older type airplanes. To keep the per-mile costs as low as possible we needed something extremely fast. After drawing up the various figures as realistically as possible, we determined that with an investment of about $1 million per unit, we could operate a 185 for approximately $1.05 per mile, which is comparable to the cost of operating one of our present-day Lodestars."

Comparative Advantages: Jets, Turbines and Piston Engines as Power.

Gardner *(Vickers-Armstrong):* "The 2- or 4-engine turboprop is more realistic for many business purposes than the pure jet, considering the lower initial and operating cost of the turboprop, and its greater flexibility. Exterior noise, runway performance and temperature accountability are also factors.

"If we're dealing with small twins averaging 200 mi. hops with from 4-10 passengers, it will be difficult to beat present piston-engine planes, and I don't see why anyone should want to. Even with bigger aircraft on such hauls the latest pure jet saves only minutes on, say, the DC-3, and is much more expensive.

"On the other hand, for business flights of 1000 mi. or more, there is a good case for the pure jet, but it would have to be

(Continued on page 36)

680 SUPER AERO COMMANDER ILLUSTRATED

Time flies with the air-minded executive! He can make on-the-spot decisions at far-flung plants in a matter of hours. As he flies en route, he can carry on his work routine in his efficient office-on-wings.

Aero Design, manufacturer of executive aircraft, knows the importance of meeting tight business schedules. And on the *680 Super Aero Commander*, AC Aircraft Spark Plugs are specified with this Lycoming GSO-480-AIA Series. The added performance and reliability of AC Platinum Electrode Spark Plugs have been proved in millions of hours of flight in military and airline planes.

For higher performance and lower maintenance, insist on AC Platinum Electrode Aircraft Spark Plugs in your planes . . . you'll notice the difference right away!

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NEDA plan for business aircraft

National Emergency Defense Airlift provides vital supplementary air power to Federal Civil Defense

Frances W. Nolde

If this nation were to mobilize under a wartime situation, commercial airline aircraft would be insufficient in number to support military, Civil Defense, and other projected government agency and war production requirements. Military requirements for direct support have been met by the allocation of approximately 350 4-engine air carrier aircraft with plans for immediate deployment overseas to supplement existing military air transport. This has been designated the Civil Reserve Air Fleet (CRAF) plan. The remaining air carrier aircraft will constitute a War Air Service Pattern (WASP) which will provide domestic (and possibly international) airlift under an already established Air Priorities System. But requirements projected by the Federal Civil Defense Admin., military, and other government agencies for WASP airlift indicate an insufficient number of aircraft to fulfill these wartime assignments.

There does exist, however, a fleet of business-owned aircraft capable of providing a vast supplemental airlift to support the extraordinary requirements of FCD should the necessity ever arise.

In order to provide for this supplemental airlift to augment the known deficits, the Administrator of the Defense Air Transportation Admin. of the Dept. of Commerce, Mr. Theodore Hardeen, Jr., in initial agreement with FCDA Administrator Val Peterson, has devised a voluntary program whereby some 800 multi-engine business-owned aircraft over the weight of 12,500 lb. would be used to support the enormous Civil Defense requirements in the initial stages of an emergency. This voluntary plan has been designated by DATA as the National Emergency Defense Airlift (NEDA) plan.

These 800 multi-engine aircraft represent some $100 million worth of equipment as a standby reserve in existence at no cost to the taxpayer and immediately available for alleviation of disaster should it strike. Of equal importance are the pilots and the maintenance personnel and facilities to keep these planes in the air. This business fleet, together with its operations personnel and facilities, is in existence today and is growing rapidly. The voluntary cooperation of the owners and pilots of these planes will put at the disposal of FCD a vast auxiliary airlift which may well save the lives of millions of citizens after a bombing of the continental U.S.

Medical supplies and blood plasma have been stockpiled by FCD at 39 locations troughout the U.S., and there are 75 engineering stockpiles at 45 additional sites, many of these well outside the target areas. It will be of vital importance to move these materials, as

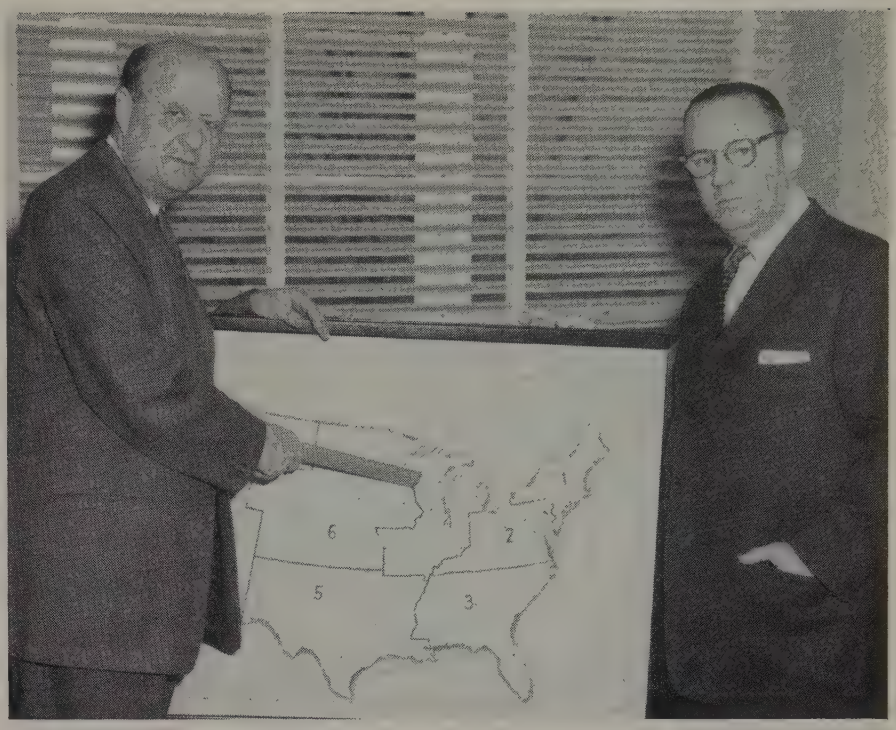
GOV. *Val Peterson and Theodore Hardeen, Jr., discuss with Frances Nolde and Bill Lawton the role of the helicopter in emergency situations. Mrs. Nolde is Director of the General Aviation Div., Defense Air Transport Assn.; Lawton is Executive Director and Secretary of the NBAA, which has approximately 400 members representing over 1000 single- and multi-engine business airplanes. Of the 800 aircraft over 12,500 lb. required by NEDA, a large percentage would be represented by NBAA.*

well as thousands of medical personnel, at the earliest moment and by the most rapid means available. FCD attaches so much importance to these stockpiles that 55% of their entire funding has been invested in medical and engineering stockpiles. The engineering stockpiles are in Package Units consisting of 8" pipe, pumps and generators, couplings, and water purification equipment.

Recently a dynamic young Marine General, Wendell H. Duplantis, USMC (Ret), has been appointed FCD Asst. Administrator, Operations Control Services. He is responsible for Communications, Supply, Transportation and Emergency Operations which include, of course, natural disasters.

The size of the business fleet and the money invested in this equipment points up the resourcefulness and vision of American businessmen, and the flexible thinking behind the expanding economy of a free-enterprise nation. As branch plants are added at various locations throughout the U.S., the necessity for employees to travel is greater, and to increase overall efficiency, travel time must be cut to a minimum.

For example, Diamond Alkali Co., Cleveland, now has 16 plants located all the way from the West Coast, throughout the Southwest and to the East. The use of Diamond's DC-3 has played a mounting and vital role in the successful operation of their widely separated plants. Some of the large oil companies have as many as 25 airplanes of various types, and employ their own mechanics to provide major maintenance for the fleet. Steel, dairy products, mining and metal, glass, chemicals, automotive products, tires and rubber, pipelines, textiles—these are only a sampling of the products and services of industries which have come to rely on the use of company aircraft to obtain maximum efficiency and economy of operations.



FCDA *Administrator Val Peterson (left) points out the seven civil defense regions of the U.S. to Theodore Hardeen, Jr., DATA Administrator, a pilot for ATC during WW II.*

It is obvious that a return to full-scale national production will be of paramount importance to the government and the nation. Therefore, the use of NEDA aircraft in providing medical care for civilians and restoring manufacturing facilities will serve to expedite greatly the resumption of the nation's production, and as rapidly as possible the NEDA aircraft will return to their essential war-supporting functions for the companies which they represent.

FCDA Administrator Val Peterson, himself an expert helicopter pilot, is happy to note the recent increase in company-owned helicopters. More than 35 companies have added a helicopter to their current fleets. These helicopters may well be worth their weight in platinum in the saving of lives in a wartime emergency.

In a following issue, SKYWAYS will bring you the detailed story of the organization of the NEDA plan, how it will actually work, and its relation to the Security Control of Air Traffic (SCAT) plan.

ONE *of the most popular and widely used executive transports is the DC-3. This one is owned by Diamond Alkali Co., Cleveland, Ohio. Piloted by C. E. Whecler and A. F. Jones, Diamond's plane recorded over 100,000 passenger miles in the first 4 months of company operation. The DC-3 meets the weight requirements of the National Emergency Defense Airlift plan. Aircraft volunteered for NEDA service will bear the insigne, inset at top left, in the form of a red, white and blue decal.*

NAVICOM

USAF Radar Weather Advisory Service

The USAF has agreed to pilot requests for improvement of Radar Weather Advisory Service by issuing a revised version of procedures, Air Defense Command Regulation 55-51.

The new regulation provides the following improvements in the service:

1. A common call sign—"Star Gazer"—is provided to identify a request for service.

2. A discreet frequency, 133.2 mc. (GCI Common), has been provided. If necessary, 121.5 may also be used.

3. Direct ATC handling the ADC Radar will coordinate with ARTC any suggested route deviations where practical, else pilot will be advised to obtain same by standard methods.

The chart of the U.S. indicates the geographical location of G.C.I. sites. Pilot procedures have been extracted from the regulation and are shown. It is particularly important that the procedures be complied with as set forth. Pilots should continue to guard the normal enroute ATC frequencies if practical, else advise ATC that they wish to switch to "Radar Advisory Service." Even though GCI may voluntarily make requests for and forward ATC clearances, pilots should not press for this service.

This new procedure makes for more efficient use of this service. Previously, air carrier and other aircraft desiring this service were compelled to make prior arrangement through ATC to request ADC to listen on emergency channel 121.5 mcs. Frequently, calls to ADC radar initiated on 121.5 mcs. without this time-consuming coordination were generally ignored.

Although provision is made to continue 121.5 as an alternate frequency, it is not made clear whether service in this changed procedure is going to be exclusive and discriminatory in nature by continued or increased lack of response to calls on 121.5 by aircraft unable to obtain response on the "discrete" frequency of 133.2. In this regard, self-imposed pilot discipline to discourage unwarranted use of or excessive traffic on either frequency will have an inevitable bearing on ADC response. (See *Navicom*—Skyways Aug. 53).

Pilot Procedures.

(1) The pilot will request Radar Advisory Service through use of the call word "Star Gazer" on the radio frequency published for this use in standard aeronautical publications, e.g.:

"Star Gazer this is (Ident. Position, Heading) (IFR) (VFR) Flight Plan, Over."

Thereafter the pilot will use the call sign of the radar station which responds. Information concerning type of flight plan is required by the radar facility to indicate whether or not coordination with the ARTCC is required.

(2) Whenever airborne equipment permits, the pilot on an IFR flight plan should continue to guard the normal enroute ATC frequency while in contact with the radar facility. Where this is possible, it will not be necessary for the pilot to advise the ATC guard station that he is going to contact the radar facility for advisory service.

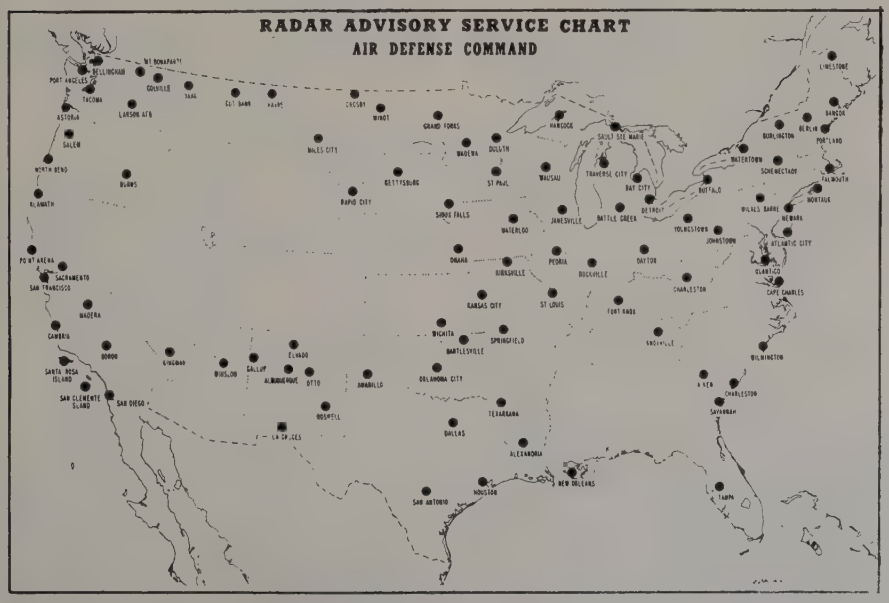
(3) If it is necessary to leave the normal enroute ATC frequency in order to contact the radar facility, the pilot on an IFR flight plan shall advise the ARTCC (direct or via appropriate communications station), *"Changing to Radar Advisory Service."*

(4) The pilot will immediately return to the normal enroute frequency on receipt of one of the following: (a) The word "Unable"; (b) Storm location information only, followed by "Unable."

(5) The pilot will return to the normal enroute frequency and report: (a) When radio contact with the director is lost; (b) When notified by the director that radar contact has been lost; (c) When the advisory service is completed.

(6) The pilot will monitor the advisory frequency when advised by the director to stand by for ATC clearance.

Ed. Note: This article is an abridgement of a paper presented at the IATA Flight Technical Conference, Amsterdam, Nov. '55.



PURPOSE *of the radar weather advisory service is to enable business aircraft in flight to be advised of storm areas observed by air defense radar facilities indicated above.*

50 KC Spacing of VHF Channels Planned; New HF Plans Discussed

In an address by CAA Administrator James T. Pyle at the 2nd *Jet Age Conference* of the Air Force Assn., it was revealed that the many-fold increase in flying has jammed our radio communications channels to a point where they are becoming a traffic control bottleneck.

"Since the portion of the radio spectrum assigned to aeronautical communications is limited by international agreements, the only way we can get more channels is to space them closer. Our present spacing in the VHF spectrum is 200 kc. Channel spacing of 100 kc would double the number of available channels, and 50 kc spacing would quadruple it.

"Channel spacing is determined principally by stability characteristics of the *transmitting and receiving equipment.* Present day design techniques make it feasible economically to mass-produce equipment which will function satisfactorily with 50 kc channel spacing, and we are considering ultimately using spacing of this magnitude.

"As a first step toward creating more channels, the CAA has ordered about 2500 narrow-band communications receivers which will permit satisfactory reception of transmissions 100 kc apart. The first of these are being put into service this month on frequencies most commonly used by the air carriers, since air carrier transmitters have frequency tolerances which are entirely adequate for use with the narrow-band receivers.

"The emergency channel of 121.5 mc, and the itinerant and military VHF channels, however, will continue to be guarded by the present broad band type of receiver *until* Jan. 1, 58. After that date the CAA may assign narrow-band receivers to these frequencies as well. During the interval, those using the emergency, itinerant and military VHF frequencies will have plenty of opportunity *to make sure* their transmitters are within the required tolerance."

Future of AF Communications

At the ARINC (Aeronautical Radio Inc., airline radio communications cooperative organization) Symposium on Single Sideband-vs-Double Sideband HF communications held Feb. 1, 57, certain conclusions and recommendations were made on the future development of the AF communications spectrum, primarily with regard to international, long range requirements.

"The first question to which the group gave attention was the matter of spectrum economy, specifically the question of whether, if spectrum economy is desirable, can we get more communications per kilocycle with double sideband or single sideband. We gathered that the data experts felt that any type of data which could be transmitted over HF communications circuits could be handled on single sideband as well as on double sideband. In fact, some experts went so far as to state that for anything which could be transmitted over double sideband systems the same information could be transmitted as fast over single sideband systems with only half the band width. It was again emphasized that this technique requires less AFC band width than GE DSB technique and should therefore work at lower signal-to-noise ratios and at the same time still utilize half the band width of the double-sideband technique.

"After careful review of all the information presented we must state our opinion very frankly. We feel that the case presented for the double sideband system is not sufficient to warrant either: (a) endorsing double sideband as the natural replacement for conventional AM communications, or (b) holding up the single sideband program as established by the world's airlines while the industry continues a further evaluation of double sideband communications.

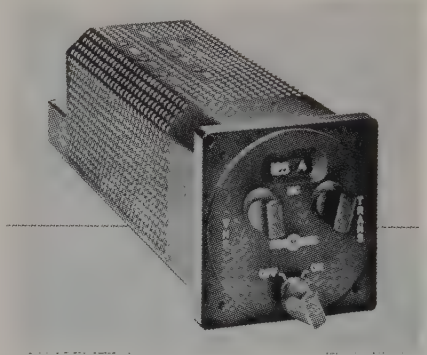
"We do not wish to extend our conclusions any further in regard to the particular type of single sideband operation which is likely to materialize. Several airlines feel that an airline evaluation program should be carried out after equipments are available, to determine the basic parameters which should be adopted internationally to define the particular SSB system.

"Fortunately the various techniques of single sideband can be made mutually compatible so that a decision on the particular type or the exact method of transition from one to the other can be developed at a later date—but still before airline fleet procurements are begun." This conclusion is important *to operators of the business aircraft fleet* in the transport categories, because development and production costs make it unlikely that the radio equipment for business aircraft will ever be developed independent of airline requirements.

However, it is pertinent to note that ARINC, in commenting on the proposed change of FCC Rule Part 9 (to require the use of single sideband transmission in the Aeronautical mobile service for radio telephony on frequencies below 25000 kilocycles), states that it would be opposed at this time to any proposal for compulsory use of SSB. This could only be undertaken as a transitional program. The problem of major significance is the question of full compatibility between SSB and conventional methods of radiotelephone communications. Existing operations must be protected and service *must not be* restricted to those aircraft which would continue to carry conventional equipment.

.1 MC Multi-Channel Transmitter

Just when many operators of single and light-twin business aircraft had brought their radio-equipment abreast of the multi-channel requirements of today's hi-density areas and ATC problems, the CAA threw another curve by introducing 100 KC spacing of some communications frequencies, i.e. requiring the even decimal frequencies .2, .4, .6, .8, and .0 for certain vital control functions. Hence, yielding to the inevitable, it is more than gratifying to find manufacturers "picking up the ball" in this respect for the many operators of all sizes of business and personal aircraft who cannot too quickly "write off" current equipment lacking this facility or adaptation to the new standard.



NEW *Collins VHF transmitter provides 90 separate channels from 118 to 126.9 mc.*

The Collins VHF Transmitter 17L-8 provides 90 separate channels in the range between 118 and 126.9 mc. Crystals for the complete coverage are built in the transmitter. This gives the user every channel for VHF communication by private and business aircraft. A minimum power output of 3 watts is available. Modulation by a carbon mike of up to 90% from the transistorized modulator permits efficient and crisp communication.

The RF portion of the 17L-8 consists of a frequency-doubling arrangement in which 19 crystals are combined in pairs to give a total of 90 RF channels. Each of two knobs on the front panel control crystal switches—one for megacycle changes, one for tenth of megacycle changes. The output from two oscillators is mixed and the output is doubled twice in the following two stages to produce the final frequency, which is amplified straight through in the power amplifier. RF stages are capacitively tuned by a condenser attached to the megacycle control shaft. Slug tuning of each stage is provided for trimming of the transmitter circuits to provide for required tracking accuracy.

The modulator section of the 427A-1 is completely transistorized with a class B final stage. Properly designed filtering eliminates any possibility of hash from the 27.5V DC input. Reduced distortion and increased stability are aided by utilizing common collector circuitry. The output to the load impedance is limited before the overmodulation point is reached.

The transmitter operates entirely from 27.5V DC, and high voltage is provided by a transistorized oscillator-rectifier circuit.

The 17L-8 incorporates 5 tubes; 5 transistors are used in the 427A-1 power supply-modulator. The use of transistors increases the reliability greatly by reducing heat. The use of a transistor power supply in place of a dynamotor is to give increased performance-to-weight ratio and further increase efficiency and reliability and reduce maintenance.

The RF portion of the 17L-8 transmitter is contained in a case designed specifically for mounting in either of two standard aircraft instrument mounting cutouts, either common 3¾4" circular cutout or 3.22" square cutout with beveled corners. This allows for either front or back panel mounting on the latter and back mounting on the former. The RF case size is 8⅝" long from the back to the front of the mounting surface. Antenna and power connectors connect to a shelf in the rear and therefore do not need to extend beyond the 8⅝" dimension. The dust cover is 3.187" square with beveled corners to fit the latter cutout from the front.

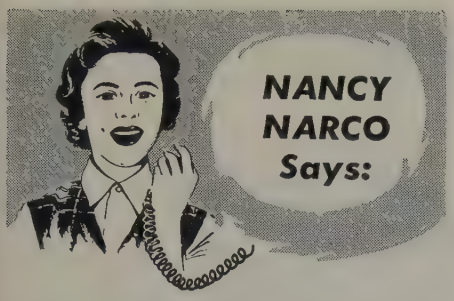
The modulator-power supply dimensions: 6⁵⁵⁄₆₄" x 4⁷⁄₁₆" x 3⁹⁄₁₆". These dimensions allow the use of two modulator-power supply units placed end to end in a short ⅜ ATR mounting space. The detachable base plate has 4 mounting holes on 2.812" by 5.797" centers for mounting *anywhere* in the aircraft *without shockmounts.*

Total weight is 5¼ pounds. Input power is 10w "standby," 55w "operate" at 27.5V DC. Output power is 3 watts.

Tucson Municipal Airport Now Requiring Two-Way Radio

Operating (properly tuned and adjusted) 2-way radio is a prerequisite to the landing and taking off of aircraft at Tucson Municipal Airport after May 1, 57. Aircraft not so equipped may at the discretion of the management be allowed one landing and/or take-off provided same is (a) arranged in advance by other communication with the control tower or (b) is an absolute emergency of such a nature or occurring to such type aircraft that it cannot land at other airports which do not require two-way radio.

Ryan Field, 12 mi. W. of Tucson Municipal, where 2-way radio is not necessary, can and should be used by light aircraft which cannot for any reason comply with the foregoing.



HAD A STARTLING NOTE from a guy out in Nebraska the other day. Said he had this mess of communicating frequencies all worked out—had it figured so he could do all his talking en route, approach, tower and everything on the four-channel transmitter in his Narco Superhomer (the old VHT-2, that is).

EN ROUTE he would call for weather or file his flight plan on 121.5 mc, the emergency channel—tell the man he was unable to establish communications on any other frequency.

TOWERS he would call on 121.9 mc. ground control—no matter where he was. Said all the towers had this channel, so why fuss with any others? And for real important messages, like telling his girl he'd be late for their date, he used 122.8 mc. unicom.

EVEN WHEN they tried to fox him by putting some fields on the alternate ground control frequency, 121.7 mc, he was ready for them with his one remaining unused channel, and would I please have Narco send him a 121.7 mc crystal?

HE WENT on to say he thought he ought to get this crystal for free, in appreciation of his contribution to the simplification of things in general. I didn't read the rest of it. Answered his letter tho, and let him down as gently as possible. Besides breaking about every rule in the book, he was just not being fair to the rest of us in the air. Things are confused enough with everyone obeying the rules.

IF YOU'RE DOING any flying in congested areas you know all about the channel problem. Folks here at Narco tell me over 8,500 of you are using our Homer and Superhomer series radios with four-channel transmitters. You can do the job, but you might feel a little cramped for channels if you work Los Angeles, San Francisco, Midway, LaGuardia or others which don't guard 122.5 mc any more. They guard 122.7 and ground control is 121.7.

SO LET'S SEE—4 channels give you 122.1 En Route, 122.5 and 122.7 Tower, and *either* Unicom (122.8) or Emergency (121.5) or one Ground Control (121.9 or 121.7), not both. You'll get by, but it's so tight that the Narco engineers have managed to put a bunch more channels in the latest Superhomer; there are 12 of them in the new Model VHT-3.

OF COURSE, the de luxe way to communicate is Simplex—talk and listen on the same frequency. When the chart says the tower is on 118.7 mc, set your receiver *and* your transmitter to this frequency and fire away.

Sincerely,

Nancy

NARCO • Fort Washington, Pa.

ANNOUNCING FOR 1957

narco SUPERHOMER

Single Package VHF Communications and VOR Navigation Unit at Lowest Cost

Here's the most popular VOR/VHF radio combination in use today. In a single, compact unit you get crystal-clear two-way VHF communications *plus* VOR navigation that takes the worry and guesswork out of cross-country flying.

Incorporating improvements and refinements evolved in five years of use in thousands of business airplanes, this latest model of the Superhomer is more than ever the right answer for low cost radio equipment. High volume production, plus maximum design simplification, makes the Superhomer available at hundreds of dollars less than any equipment of similar usefulness and reliability.

NOW WITH *12 Channels*
PLUS THESE OTHER GREAT FEATURES

- VHF receiver (108 to 127 mc)
- Accurate VOR navigation
- Self-contained power supply
- Weighs only 11 pounds completely installed
- Complete unit measures only 4¾" by 6¼" by 10¼"
- Fits any standard glove compartment
- Priced, with three crystals, at only **$499.50**

Why not replace your old radio with a brand new Superhomer? Or, if you are not now enjoying the benefits of reliable two-way VHF communications and the pleasure of flying cross-country via VOR, why not see your Narco dealer for full details on the remarkable Superhomer backed by nation-wide Narco service?

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NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

SAFETY EXCHANGE

High-Density Rules Formalized

The CAB has empowered the Administrator of Civil Aeronautics to designate high-density air traffic zones surrounding major airports throughout the U.S. and prohibited air speeds over 180 mph within them.

In a series of major revisions of its Air Traffic and General Operating Rules, which took effect Mar. 15, the Board also ordered all radio-equipped aircraft to communicate with air traffic control facilities before operations to or from high-density airports in the new high-density areas. Unreported aircraft enroute through such an area below 3000′ would remain "surprise packages" to any pilot wrongfully assuming separation from all other aircraft unknown to ATC! Planes without radios can perform these operations and also to and from other fields in the zone only with prior control tower permission.

The Board also said that regardless of clearance, no pilot can take off or land at an airport in any control zone, or fly in such a zone, when visibility is less than 1 mi. This ended the ridiculous situation which previously existed wherein instrument flight rule minimums required higher visibility standards than so-called "controlled VFR" minimums (merely remaining clear of clouds)! In special circumstances, such as local smoke conditions, the visibility minimum can be lowered to ½ mi.

The new high-density regulations are the outgrowth of an actual experiment authorized by the Board and conducted at Washington National Airport by the Administrator from Aug. 1, 55 to Jul. 31, 56.

Use Foam For Gear-Up Landings

Where repair costs are as closely related to the profit-and-loss margin as in aviation operations, it is not good sense ever to assume the obvious; so, although maybe almost everyone may be familiar, it may save some operator a substantial loss and perhaps even injuries to crew and passengers to renew a gear-up landing technique that has proven itself quite a few times in military and civil service.

The foam technique, spreading fire-fighting foam along the critical part of the runway, both eases the skid of the bellied-in airplane or the up-gear side against dangerous ground-looping, and usually prevents fire from starting or spreading beyond the sparking stage. It has become standard operating procedure in most service and airline gear-up landings where the predicament is well established prior to attempting a landing.

Since most business and executive aircraft patronize the larger and well-equipped airports, this type of emergency service is usually quickly available on request. Any airport operator, whether private or community-run facility, should prefer a little foam expended on the runway beforehand than a lot more shot at a "flamer" after the incident.

In the technique frequently employed for such a landing of a single or twin, it has often been found sufficient to "grease" only ½ to ⅓ of the runway width, and only as far along the runway as deemed necessary for the particular aircraft involved.

There are varying opinions, like the long-argued "off the runway or on the runway" controversy, as to whether the use of foam justifies a partially-extended gear landing at all! The comparative costs of prop, engine damage, etc. saved on the down-gear side as against the over-all saving to the aircraft in a all up-gear landing on foam are problems to be solved by each operator or crew on the spot.

Another "Midland Crash" Averted

On January 26, 1957 we were on a VFR flight from N.J. to Salisbury via V-29, and 10 min. North of station we heard SBY Radio give the current weather as: "Sky obscured, visibility 2½, fog."

We asked for an IFR clearance to the field. At 11:50 we received the following: "Tri-Pacer 8546-C is cleared to descend VFR to 5000, 3000 cruise." The only other known IFR traffic was at 6000.

While descending to 3000, we noticed a military Constellation evidently making an approach to Salisbury airport without radio contact with SBY and was observed to go through the clouds. Upon reaching 3000 I refused to go on with my approach until I was sure what the Connie was doing, and asked SBY radio if they were in contact with the plane. They replied, "Negative."

Upon seeing it pull up from its low pass and proceed away from the field, I made my approach for runway 22, the same one the Connie had used. We broke out around 800′ and visibility not over 1 mi. As we taxied off the runway the Connie made another low pass on another runway. I may also say that below 2000′ the visibility was well below 3 mi. at all levels, with broken clouds from 1800′ with most bases around 800′.

Had I commenced my approach upon reaching 3000 we could easily have collided as we were both making an approach on runway 22, at procedure turn altitude were in and out of clouds and on final it was solid until breaking out. It was lucky we had come in high over the station, since below 3000′ we could not have seen the Connie until too late.

The SBY radio operator said he had not had contact with the military plane that day, indicating that it was probably from Patuxent; he also stated that on one other day when they did call in, he told them the field was below minimums, but the military pilot defied him and regulations and said they would do the approach anyway and maintain VFR!

We asked for an explanation as to why a plane is allowed to go through clouds and low visibility on an airway and control zone without contacting the radio facility.

When we were ready to leave, nearly an hour later, we again observed the same plane come over the field, go through a low cloud, still without radio contact with SBY.

Donald V. N. Conover, pilot. Donald Romlein, witness.

Jet Speeds Aggravate Vortex Danger

The danger of attempting to fly in air churned up by the passage of other aircraft is familiar enough to pilots, but the degree to which jet speed accentuates the problem is strikingly demonstrated in an incident reported by Flight Safety Foundation.

"An R4D on an IFR flight plan suddenly was confronted by a British jet fighter on a head-on collision course. The jet was on VFR flight plan even though forward visibility had reduced to ½ to 1 mi. in haze. Thanks to the quick evasive action of the R4D a collision was avoided, but not without considerable damage to the transport as a result of the jet fighter's wash.

"When the jet was sighted at a distance of ½ mi., the R4D pulled up in a left bank. The jet passed under the transport's starboard wing, missing a collision by about 18″. Caught in the jet's wash, the fuselage skin of the R4D was buckled, the frame at the starboard emergency escape hatch was torn at the corners, and the internal fuselage stations and bulkheads were buckled.

"After the near miss, level flight control required use of full left rudder, plus some aileron deflection. There was excessive vibration in the rudder and aileron controls, and the transport had a tendency to roll to the right."

CAA's New Type Pilot Exam

Applicants for private pilot certificates will take a new kind of written examination after March 15th, CAA has announced.

The new examination will be of the "let's go flying" type, with the candidate taking an imaginary flight to such cities as Mansfield, Akron and Pittsburgh. The latest Cleveland sectional aeronautical chart will be used for the examination.

The exam will consist of 50 questions with 4 alternative answers to each question. At least 35 of the questions must be correctly answered for a passing grade. The exam is similar in format to the commercial pilot written exam now in use. Like the commercial pilot exam, the private pilot test was actually test flown by CAA specialists.

The imaginary flight in the private pilot examination will be made under visual flight rules in a conventional

TYPE 21 ADF
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Component Unit Weights:

Receiver, 6.8 lbs.; Loop, 4.3 lbs.,
Loop Housing, 0.5 lbs.; Indicator, 1.3 lbs.;
Control Unit, 1.6 lbs.; Power Unit, 5.2 lbs.;
CAA Certificate No. 1R 4-9

NEW LOOK in navigation aids

The Time Tested ADF Now In Less Weight, Less Space

The ADF is a basic air navigation instrument, used in all parts of the world, tunable to some 60,000 transmitters. But the important thing now about the ADF is that ARC has engineered an ADF system down to less than 20 pounds in weight, with a comparable saving in space.

Now pilots enjoy the advantages of dual installations of this compact miniaturized equipment in tolerable weight and space requirements.

The ARC Type 21 ADF is built to today's more critical speed and environmental demands. It has hermetic sealing of vital components, such as the entire loop assembly. It covers all frequencies from 190 kc to 1750 kc . . . operates on only 2.8 amps at 27.5 volts dc input. A significant feature is the extremely low loop drag – only two inches below the aircraft skin.

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ARC

single-engine aircraft. The applicant will be provided with the necessary sectional chart, weather information, Flight Information Manual and Airman's Guide at the time he takes the exam. The time required for a well-prepared applicant to complete the questions is expected to be between 2 to 3 hrs.

The new examination attempts to teach as well as test: in between the questions are such introductory statements as "After determining that it is safe to do so, you enter the traffic pattern at a 45° angle downwind, turn on base leg, and then turn on final approach. You maintain adequate speed since you know that *effective control* depends on maintaining a certain minimum airspeed. Upon landing at Phillipsburg, your altimeter (if properly calibrated and set at the correct 'altimeter setting') will indicate the elevation of our airplane above sea level."

A study guide for the exam will be available for sale later this year. It is now available for inspection at any CAA District Safety Office.

Late Flash: ATC or No ATC?

Pending further investigation, an airline captain's ATR rating has been suspended for deliberately climbing through another aircraft's altitude on 80% solid instruments with resultant near miss. Although ice was mentioned, the captain declared his emergency action based on ATC refusal to approve the higher altitude, and the assigning of that altitude to the other airline aircraft, which was off the ground after the subject pilot.

A more complete report will appear in a later issue.

Accident Report

Crane PV-1 Crash Ascribed to Disconnected Idle Mixture Link

The Accident (CAB Report Abridged)

A Lockheed PV-1, N 64001, owned and operated by the Crane Co., crashed near Jeffersonville, Ind., May 15, 1956, about 1038.[1] All 8 occupants—6 passengers and 2 pilots—were killed, aircraft destroyed. Fire did not follow.

History of the Flight

Flight was for the purpose of transporting 6 Crane officials from Chicago, Ill., to Louisville, Ky., to attend a business convention. Departure O'Hare-Chicago Int. on a VFR flight plan (changed en route to IFR) the Crane Co.'s Chief Pilot R. A. Mulherin, and R. H. Robinette, as copilot.

After takeoff the pilot gave a routine report to Chicago radio of his time off as 0908 and his estimated elapsed flight time as 1 hr. 20 min. He did not request weather information at that time. Other radio contacts followed as the flight progressed, the final one being at 1034 over the Jeffersonville intersection. An approach was then started from that point to the Standiford Airport, 6.9 mi. distant. During this approach the aircraft struck trees and crashed at a point ½ mi. N. of the Jeffersonville intersection.

Investigation

From the Jeffersonville intersection to Standiford Airport the course is 190°. The direction of impact was about 175°; the vertical angle was 48° below the horizontal. Just before striking the ground the aircraft tore through trees and then passed, nearly on its right side, between two others 18′ apart. (The span of the aircraft is 65.5′) A large, open field was directly ahead.

Study of the severely distorted and fragmentary wreckage indicated that the landing gear and wing flaps were retracted at time of impact. Nothing whatever was found to indicate or even suggest that there had been any malfunctioning of the airframe or of any of its components or controls prior to impact.

Although much of the radio equipment of the aircraft was damaged almost beyond recognition it was possible to determine some of the precrash settings.

The red ADF control head was set at 360 kc. The selector switch was on compass position. The Louisville, Kentucky, low frequency range is 359 kc. The green ADF control was completely disintegrated and no reading was obtainable, however. The ADF radio compass azimuth scale was completely destroyed.

The No. 1 omni bearing course selector indicated 330°. The localizer and glide path needle were destroyed. The No. 2 omni bearing course selector was destroyed. (The outbound radial from the Louisville VOR to the Jeffersonville intersection is 332°.)

The VHF NAV-1 omni was tuned to 110.3 mc. The ILS localizer frequency at Standiford Airport, Louisville, Kentucky, is 110.3 mc. The VHF NAV-2 omni was set at 112.1 mc. The frequency of the Louisville omni range is 112.1 mc.

The VHF transmitter selector was on 121 mc. The last digit following 121 was not legible. The communications emergency frequency is 121.5 mc. The Standiford ground control frequency is 121.9 mc. The VHF receiver was tuned to 120.0 mc. (The Standiford approach control frequency is 120.3 mc.)

Investigation disclosed that all pertinent ground radio facilities were functioning normally at the time of the accident.

Both carburetor heat controls were found in the direct or ram air position (carburetor heat controls "off"). These controls lock into detents. The force of ground impact dislodged the right carburetor heat control only slightly from its detent.

The carburetor heat control quadrant had not been modified on this installation to permit intermediate positions (varying amounts of heat) as it had by individual operators of many similar aircraft. Both the modified and the unmodified installations are considered airworthy. Use of full carburetor heat on final approach is not recommended for the subject type engines as severe detonation can occur if a go-around is necessary. Carburetor heat is customarily used if induction icing is anticipated.

At 1022 the flight called Louisville approach control for further clearance and was cleared over Henryville to the Jeffersonville intersection to maintain 5,000′ and to report passing Henryville. The distance from Henryville to the Jeffersonville intersection is 14 mi. At 1029 the flight reported passing Henryville, was cleared to descend to 2,600′, and reported leaving 5,000′. Very shortly thereafter Louisville asked the pilot if he would accept an ILS back course approach. The pilot then asked for the Louisville weather which was given his as: Measured 500 variable broken, 800 overcast; visibility 2 mi.; light rain and fog. The pilot then advised that he would accept this type of approach and at 1034 was cleared to the minimum altitude of 2,100′ m. s. l. Also at 1034 the flight reported over Jeffersonville intersection and reported leaving 2,600′. No difficulty or irregularity was mentioned. The course from Jeffersonville intersection to Standiford is 190°. The 1034 transmission was the last heard from the flight which crashed about 1038, as approximated from impact-stopped watches and ground witnesses. The applicable weather minimums for the subject approach were 500′ ceiling and 1 mi. visibility. The elevation of the Standiford Airport and the terrain at the crash site is about 500′ m. s. l.

All fuel tanks had been filled to capacity of 1,066 gal. on the day preceding the accident and the aircraft was then flown 2 hr. Fuel was not added for the subject flight on the following day. The estimated gross weight at the time of departure was 27,360 lb. The maximum permissible takeoff weight is 31,000 lb., and the maximum allowable landing weight is 26,500 lb. The weight at the time of the accident, based on fuel burnoff, is estimated as 25,740 lb. Since the fuel capacity is 1,066 gal. it appears that there were some 436 gal. aboard the aircraft at the time of the crash.

Examination of the powerplants was conducted as thoroughly as their badly damaged condition would allow. There was no indication of internal failure in either powerplant except for an irregularity in the left carburetor assembly which will be detailed later. There was no evidence of lack of lubrication in either powerplant.

Examination of components of the left propeller feathering system revealed them to be extensively damaged during impact; however, inspection revealed no evidence to indicate failure of in-flight operation.

The right engine propeller shaft splines were appreciably distorted indicating high rotational forces at the moment of impact. This type of damage was not found in the left engine.

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More than 25 years of proven service in the aviation industry have made Rebat Aircraft Batteries *preferred* as original and replacement equipment. Rebat is chosen for more makes of personal, business and industrial planes than all other makes combined. And there's a reason!

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The left carburetor idle control valve linkage had become detached from the carburetor at the throttle shaft end. This fork end of the linkage was spread open slightly beyond its normal opening with no appreciable marks of impact damage. There was no visual evidence of elongation of the bolt holes in the fork. A 3/16 steel bolt with a cotter-keyed castellated nut is used to attach this aluminum alloy fork to the throttle shaft linkage. Any impact loads sufficient to remove the bolt from this linkage would be expected to mutilate the aluminum alloy fork.

The design of the carburetion system is such that the idle valve will close to the idle position and pass to the carburetor only enough fuel to allow idling when this throttle linkage is disconnected.

This disconnected fork was the only significant irregularity found in either powerplant. Examination of the various other accessories of both engines necessary for power output, as well as bench testing of those that were sufficiently free of impact damage, revealed no pertinent irregularities.

Computed temperatures based on upper air observations indicate the temperature at 49°F. at 5,000′, and 58°F. at 1.000′ m. s. 1. for the time and place of the accident and over the latter portion of the route flown.

The records show that the left engine and its accessories were overhauled by a CAA approved repair station Mar. 18, 1955. At the time of the accident the engine had acquired 234 hrs. since that overhaul. On Jan. 20, 1956, the last 100-hr. periodic inspection was made. During this inspection no irregularities were noted. The engine had acquired approximately 80 hrs. since this last 100-hr. periodic inspection, and the last 33 of these hours were after the Crane Company purchased the aircraft. During the Crane Co.'s brief ownership of this aircraft no inspections involving the subject carburetor linkage were required other than normal, routine inspections; these were made without any irregularities being noted. Examination of all available maintenance records of the aircraft and of both powerplants indicated no significant discrepancies or omissions. All maintenance was current as far as could be determined.

A scheduled air carrier took off from the Standiford Airport and at an altitude of 3,000′ m. s. 1. passed closely adjacent to the crash site 3 to 5 min. after the accident occurred. Its captain stated: "We were on solid instruments throughout the climb to 6,000′, encountering moderate to heavy rain, but no turbulence. The outside air temperature was well above freezing. All Louisville navigational facilities appeared to be operating normally."

During rain, aircraft engines of this type will sometimes manifest irregularities of operation similar to those caused by induction icing. The remedy for such irregularities is the same as for induction icing difficulties. i.e., to apply carburetor heat.

(Continued on page 35)

MAINTENANCE

Two Airports in Two Miles; Private Owner Gets Injunction

The proposal to build a municipal airport and a jet training facility for the Penna. Air National Guard at Admire (nr. York), Penna., has been halted by an injunction obtained by Oscar L. Hostetter, owner and operator of a private airfield 2 mi. from the proposed site of the Port Authority facility. According to Hostetter, his objection is based on the issue of "whether public monies can be used to duplicate, and ultimately force out of the field, the operations of private enterprise."

The York Port Authority planned to build a $4 million field at Admire with the help of PANG, which was interested because it wanted to conduct jet training operations there. The Authority was granted permission to float a $1 million bond issue to further the project, and $275,715 in Federal Air funds were allocated for runways, taxiways, and lighting. The Authority hoped to get additional funds from state and Federal sources. The injunction has tied up Federal airport aid funds allocated out of fiscal 1957's program and for the time being has forestalled hope of financial assistance from PANG.

In his petition to the Court of Common Pleas of York Co., Hostetter charges that the proposed airport would duplicate existing and adequate facilities, which he says is contrary to the laws of Penna. and the Federal aid to airports program. He also charges that the proposed field is so close to his own as to constitute a hazard, also against Penna. law, according to his brief.

Although the case now is being tried in a local court, it has generated more than local interest. James T. Pyle, CAA Administrator, made a quick trip to York to confer with city officials. Pyle concluded that despite the fact that Federal aid funds were tied up, there was nothing CAA could do until the local conflict is settled. The case went to a hearing in January, but observers feel that it will be months before a decision is handed down. The Airport Use Panel of the ACC is also aware of the conflict, but will not involve itself while the case is in the courts.

Directory to Bay Area Aviation Service Facilities Available

Aeronautical Services in the San Francisco Bay Area, a survey of airport and aircraft facilities designed as a directory for business or private aircraft owner or operator, has just been published by the Bay Area Aviation Committee, according to an announcement by Fred Taplin, committee chairman.

The 22-page booklet lists 15 airports in the area, and outlines the facilities available at each. Aircraft suppliers, dealers and services are listed, with addresses, by the type of service offered. A complete section is devoted to CAA facilities and services in the Bay Area.

The booklet was prepared by the Aviation Committee to provide a single source of information on aviation in the Bay Area in keeping with the committee's policy of fostering projects devoted to the progress of Bay Area aeronautics. The Committee is an affiliate of the San Francisco Bay Area Council.

The book is available from the Council at $1.00 per copy. Council is located at World Trade Center, Ferry Bldg., San Francisco 11, Cal.

Heavier Planes Considered in New CAA Airport Paving Design Book

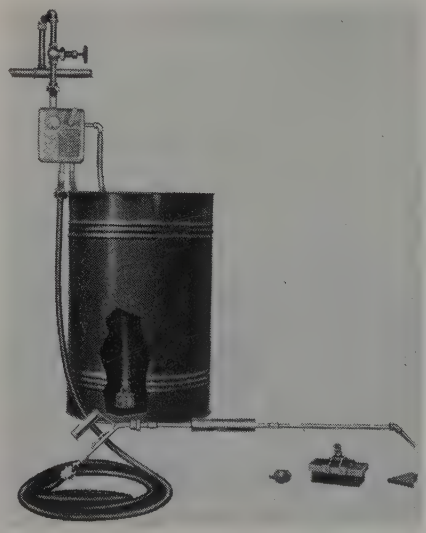
Pavement design for airports that must accommodate heavier planes, such as the projected jet transports, is a feature of the new manual, *Airport Paving,* recently issued by the CAA.

Although the new manual reflects pavement design changes brought about by present and proposed large civil transport aircraft, basic design considerations related to paving materials, soils, subgrades and climatological influences remain practically unchanged.

Paving design data previously available only under limited distribution are now incorporated into the booklet, which has been expanded to include a chapter on methods of converting the loads on multi-wheel undercarriages to equivalent single-wheel loads. Other new chapters are devoted to airport pavement overlays and pavements for secondary airports. The manual is for sale at Govt. Printing Office at 40¢ a copy.

Fast Steam Cleaning for Maintenance Operations

An injector unit that uses existing steam supplies for steam cleaning, paint stripping, phosphating or sanitizing has been announced by Turco Prods., Los Angeles. The device is said to provide complete steam cleaning facilities to fixed base operators at less than the usual cost.



The "Turco Steamerette" requires only the adjustment of 1 valve. Operating pressure range is 40-140 psi. A built-in pressure gauge indicates operating temperature, facilitates uniform cleaning by minimizing fluctuation. Quantity and pressure of solution at the nozzle may be varied from slow, full stream at moderate temperature to a hot hi-pressure blast for heavy cleaning.

No pumps, motors or complex equipment minimize maintenance. Unit is reported not to clog or overheat even under adverse circumstances. It is quickly attached to any steam line maintaining an open pressure of 40 lb. or more. Quick disconnect increases portability, permits removal of unit to any location where services are required.

Runway Topping Resists Weather, Oil

A new product for the maintenance of airport and fixed base asphalt runways is offered by Tropical Paint Co., Cleveland.

"Tropical Runway Topping" lengthens the life of asphalt runways by retarding oxidation caused by sun rays, and is reported to prevent surface disintegration in cold weather by sealing the surface against the entrance of water. It is also said to be completely resistant to gasoline, oil and petroleum solvents which would soften untreated asphalt.

AC Holds Seminar on Operation, Servicing of Aircraft Spark Plugs

The 4th aircraft spark plug seminar of GM's AC Spark Plug Div., designed to acquaint business and commercial aviation personnel with servicing and economical operation, met at Flint, Mich., in a 3-day session beginning Mar. 11. Courses concerning ignition systems for jet and piston engines, combustion chambers, cleaning and testing procedures, and features of AC's products, including quality control, research, and field performance reports on massive electrode and fine wire type plugs. The information was presented to maintenance and engineering representatives of corporate fleets and airlines, fixed base operators, aircraft manufacturers and aircraft sales representatives.

"Hangar Rash"

Hangar rash is an irritating disease picked up by otherwise healthy aircraft from people with tractors who are careless about towing aircraft at hangars and airports. Symptoms are little dents and scratches, and Sinclair Chief Pl. Joe Lacey wants to remind all av. personnel that, when towing aircraft, the man on the tractor is in command, and is responsible to see that lookouts are posted to prevent hangar rash.

. . . . in the business hangar

■ CAIR, Chamberlain Aviation, Akron, recently completed 8000-hr. overhaul and new paint job on Mine Safety Appliances' DC-3, Lou Rinebold, Pilot. Wright 1820 engines changed to P&W 1830-94's with Minor type cowl flaps and short exhaust stacks, installation of Bendix RDR1-B1 Weather Search Radar with CAIR radome, recovering of all control surfaces, wiring for engine analyzer pickups, and new galley. □ Koppers' DC-3 also having 8000-hr. inspection, overhaul of all instruments, and installation of new radio and instrument panels, Fenwal Fire Detector System, Bendix RDR1-B1 X-band radar, Sperry A-12 autopilot and engine analyzer systems, complete lightweight executive interior with bubble-type picture windows, rewiring of all electrical systems, installation of Transair wheel-well door kit. Col. B. Q. VanCott is Koppers Pilot. □ Robbins Floor Prods. recently added a Lodestar to their operation; Pilot Barney Shields brought *The Robin* to CAIR for complete custom interior, installation of Bendix A-band radar, CAIR radome, lightweight Wilcox ADF, new instrument panel, CAIR fiberglass stabilizer tips, plus batwing modification. □ Lou Ramey, Chief Pilot for Pittsburgh Consol. Coal Co., reports an increased airspeed of 8 mph after installation of approved CAIR 250F fiberglass wing fillets on his Douglas B-23. □ Kroger Co. Pilot Julian O'Neal brought their DC-3 to CAIR for installation of Bendix Airborne Weather Radar, Collins AP-101 Autopilot, and custom paint job. □ CAIR radome and Bendix radar for Thompson Prods.' DC-3, plus new generator system, Leland Inverters, Bendix TA-20/RA18C Communications System with TA-20 backup, and Collins 51R-3 VHF receiver. Also routine 100-hr. inspection and engine change.

■ Lund Aviation Inc., N.Y., announces CAA approval for their DC-3 dual Jato installation. Incorporates 2 15KS-1000-A1 1000-lb. thrust rockets internally mounted in belly. First installation was made in DC-3 N300A of Esso Standard Oil Co. Lund flush mounting is result of survey among exec. operators; only protrusion is 3/4" exhaust deflectors, offers no drag, no ice pickup, smooth appearance. Parts stocked by Lund at Millville, N.J.

■ Reading Aviation Service completed 100-hr. checks on Phila. Evening Bulletin Lodestar, piloted by Kurt Heilbron, and Pennsy RR's DC-3, flown by Bob Carney. □ Chuck Sowa and Frank O'Brien, Pilot and Co-Pilot for Virginia Coal & Iron Co., flew their D-18 Beech to RAS for installation of dual ARC-ADF-21, dual ARC type 15D omni and ARC CD-1 Course Director, plus a new carpet with "Golden Foam" underlay in the cabin. □ U.S. Steel Super DC-3 at RAS for APU installation. □ Capt. Wm. Knoch of Patterson-Emerson had double engine change made on his Lodestar. □ Capt. Welles Forbes brought Scott Paper Co.'s DC-3 for installation of all new windows. □ Sun Oil Capt. Ray Higgins recently had the DC-3 repainted at RAS. □ Narco, Inc., brought their Apache to RAS for installation of Marconi ADF. □ Jonas Aircraft & Arms Co. brought an Apache for installation of Sun Air HF system and 5-seat kit. Plane is destined for Argentina. □ Theodore Smith, Phila., had twin Narco Mk 2 Omingator with low-&-hi band transmitter frequencies. □ Four Aero Commanders to RAS for 100-hr inspection: W. & J. Sloan's new Super 680, Correale Const. Co. Super 680, Sutter Lumber Co.'s 520. □ RAS installed new Lear Vortan lightweight Omnistystem in their own Piper Tri-Pacer for demonstration purposes.

■ Aerodex Inc., Miami, announces removal of its aircraft engine overhaul facilities for executive, airline and foreign govt. planes to a new location. Commercial operation now completely separated from military; has a range of P&W R-985 series through R-2800 CB series engines and Wright R-1820 series through R-2600 series engines.

■ Horton & Horton, Ft. Worth, has "interiorized" NBAA member Forest Oil Co.'s DC-3 with pink, blue, gold and beige imported linens. Bob Agee and George Edell are Pilots. □ E. E. Outland, Abilene Aviation, chose black & white tweed, scarlet carpet, platinum mahogany interior, with folding cockpit door and stair door for his Beech D-18. □ Stunter Marion Cole, now piloting Datic Corp.'s 560 Aero Commander, has new plane interior including indirect lighting, dictaphone desk, hassock ice-box, woven wood draperies. □ Northrup's new Bell J. Ranger custom-

ized by H&H with emblem embroidered on seat cover, interior in brown, beige and gold.

■ Aviation Parts & Equipment of Del. announces opening of its Miami branch under management of A. C. "Chick" Kennedy; AP&E specializes in parts/accessories for C-46, DC-3, DC-4.

■ Executive Aircraft Service, Dallas, returned U.S. Rubber's DC-3 to Paul McCahill and Tom Cassidy after complete engine change, installation of new electrical system, 200-amp generator system, Sperry A-12 autopilot, Bendix radar, extra radio equipment, PAA wheel doors, new exterior paint, retrimmed main cabin and cockpit, refinished furnishings. ☐ Wyandotte Chem.'s Detroit Lodestar to EAS by Pilot Charlie Schenck for 100-hr. inspection, relicense, installation of rotating beacon on lower fuselage. ☐ Pilots R. F. "Wimpy" Neel and Ben Duhon brought E. W. Brown's DC-3 from Orange, Tex., to EAS for 100-hr. inspection. ☐ 100-hr. inspection complete on Sears, Roebuck Dallas Lodestar, Arch Hunter Pilot, Tom Hansen Co-Pilot; on Dow's Midland DC-3, Pilot Russell Purchase; on British American Oil's Lodestar, Bob Dodson Pilot, Angus Anderson Mechanic, plus new cabin interior.

■ Aircraft Tank Service, Inc., Burbank, recently completed fuel tank conversion on Signal Oil Co.'s DC-3, removing center section tanks and installing 550-gal. integral fuel tanks in each outer wing panel. ☐ W. L. Hartman's pilot Dean Case has their Lodestar back in the air after tank resealing by ATS.

■ Dallas Aero Service has been appointed Southwest Distributor for aviation products of Federal Telephone & Radio, will provide sales and service facilities for Federal's transistorized autopilot and newly announced Vortac air navigation equipment.

■ L. B. Smith Aircraft Corp. of Pa. is completing double engine change and radio work on Armstrong Cork's DC-3. ☐ Schubert Const. Beechcraft is in for single engine change and installation of communications equipment, plus 100-hr. inspection.

■ Bay Aviation Services has installed ARC omni and Lear LVTR-36 in their Cessna 310 demonstrator. ☐ Morrison-Knudson DC-3, Pilot Cecil Smallwood, is in for radio modifications. ☐ Bay is completing radio modifications on the U.S. Fish & Wildlife Grumman Goose, Bob Smith, Pilot.

■ Potter Aircraft Service, Inc., Burbank, completed modification on Signal Oil & Gas Co.'s DC-3, including repainting, installation of Aircraft Tank Serv. wings with all fuel located outboard of nacelles, installation of new type centerwing fillets and aileron gap closures, mfd. by Aircraft Conversion Co., and annual relicensing. Capt. Sorenson gives good reports on additional speed-up modifications. ☐ Capt. Clyde Martin and Co-Pilot Bob Stratton, of Potlatch Forest Serv., Lewiston, Idaho, had short stacks installed on their Lodestar. ☐ Capt. Milt Keyes and Co-Pilot Blue Thrailkill of Pauley Oil Co. had 100-hr inspection, annual relicensing and installation of Janitrol heater and short stacks on their plane.

Left to right are F. H. Isaacks, Manager of Cameron's Southern Louisiana Division; Roy Davis, Domestic Sales Manager, and Herbert Allen, Vice President and General Manager of Cameron Iron Works, Inc.

Seaplane Speeds Service, Cuts Costs for Cameron

CAMERON IRON WORKS, INC., Houston, Texas, manufacturers of high-pressure, off-shore drilling controls and well-head equipment, use their Cessna 180 on Edo Amphibious Floats for sales and off-shore service.

"This plane enables us to serve off-shore installations in the shortest time possible," says Herbert Allen, General Manager. "We are now able to make 10 calls in the same time previously required to make one.

"In addition to saving us valuable time, our Amphibian has enabled us to reduce service expense. The cost on the crew boats previously used was $65 for an 8-hour day. The plane operates at a cost of $22.46 an hour, but in that hour we are able to do what used to be a full day's work."

EDO, WORLD'S FOREMOST MANUFACTURER OF AIRCRAFT FLOATS, makes a complete line of standard and amphibious floats for many types of airplanes. Could a versatile, rugged seaplane assist in your business? See your nearest EDO Float dealer or write for details to:

Edo SINCE 1925 CORPORATION
College Point, Long Island, New York

Get the Full Treatment

(Continued from page 12)

97% in *any* of the departments. Ty Cobb, at his best, batted somewhere around 42% and the Rajah, Hornsby, settled for about the same. So, when a pilot "passes" on a weather briefing because it takes too long or he scorns the accuracy of the forecasts, he is passing up sound trip insurance.

Home-itus and Hurry-itus are two serious diseases which show up on cloudy days. Like the pilot, suffering from acute Hurry-itus, who rushed into the weather office. He wanted a "Quicky Briefing," what he called a "Once over lightly." Before the forecaster could finish, the pilot was out of the door. He flew a direct route and ended up penetrating one of those cauliflower types with the black core. Enough damage was done to his aircraft to ground it for extensive maintenance which took a week.

He blamed the forecaster for briefing him on a dog-leg route when he wanted to go direct. The forecaster admitted he gave a dog-leg analysis but stated he informed the pilot that the direct route was a package of trouble. He said he urged the pilot to fly the dog-leg route, where he would be able to avoid frontal weather, take advantage of winds, and his flight time would be about the same.

The pilot had been so intent upon getting in and out of the weather office he missed the most important part of the message.

Capt. Ed Gough had a flight booked from San Francisco to Chicago recently.

"I *always* get the works," said Gough. "Weather briefings make dollars and 'sense' to me. I have been able to lop off gas, time, add to passenger comfort, and save a few dollars.

"Just to be on the safe side," he adds, "a front sitting over Chicago on our ETA could delay our departure. Why not know ahead of time? Could be, due to enroute storm activity, we might want to set up an alternate route."

Here is how he planned his flight. A few hours before departure, Capt. Gough called the Weather Bureau, and told them he was going to Chicago via Victor Airways. Time of departure was 1130 PST and flight time would be 7+43. He planned on 11,000 for cruising altitude and could fly IFR if necessary, since his B-25 had full de-icing equipment.

Pilots don't have to call in early *for our benefit*," said aviation forecaster Ed Chappell. "We are briefing all day long and know the weather picture over the country. It's up to the airman. Don't forget that plus factor, a sort of extra, of local peculiarities. We are up to snuff on the local area and can often give transient pilots flight condition *tips and warnings which never appear on the sequences.*"

A pilot who landed at an airport in the desert was going right back over the same route so didn't bother to check in at the weather office. It was noon and the sun was almost overhead. The temperature was well over 100° and the airport sat on a plateau a few thousand feet high. The runway he was using for takeoff was just barely minimum for his aircraft. Undaunted, our hero loaded his plane to full gross weight. He blasted down the runway with full throttles. As the concrete disappeared behind him the head temperatures banged against the peg. He reached the end of the runway and was still burning rubber. What happened? He collapsed the gear and saved all hands on board.

"Didn't know it was *that* hot!" he said later.

There is a new system in most weather offices whereby pilots can do much of their own initial briefing while waiting for a busy forecaster. A pilot checks a large wall map, marked off in areas, by colored lines. If he wants to cover a particular area he notes the color banding that area, and checks the sequences under the proper colored clip on the display counter. The wall map also shows Prohibited Areas, useful to pilots even though they are not right up to date.

On the display counter the pilot checks the enroute sequences, terminal weather, and forecasts. When he is thoroughly familiar with the general background of his enroute weather the aviation forecaster takes him on the Grand Tour.

The forecaster explains which systems are deepening and what might be expected. He indicates the direction of movement of fronts and associated weather.

They move to the Regional Weather forecasts. Then, they examine the Hourly Sequences of stations along the route. The forecaster has been watching the weather picture for days. He can point out changes which will occur.

They cover the hourly sequences of the terminals and alternates, then discuss forecasted in-flight conditions. In this connection, George Robertson, who flies Richfield Oil's Lockheed 10 out of Los Angeles, says, "Give me *two* alternates. Why take one when you can get two for the same price? It can't be stressed too much that the selection of alternates is as vital to the flight as the terminal."

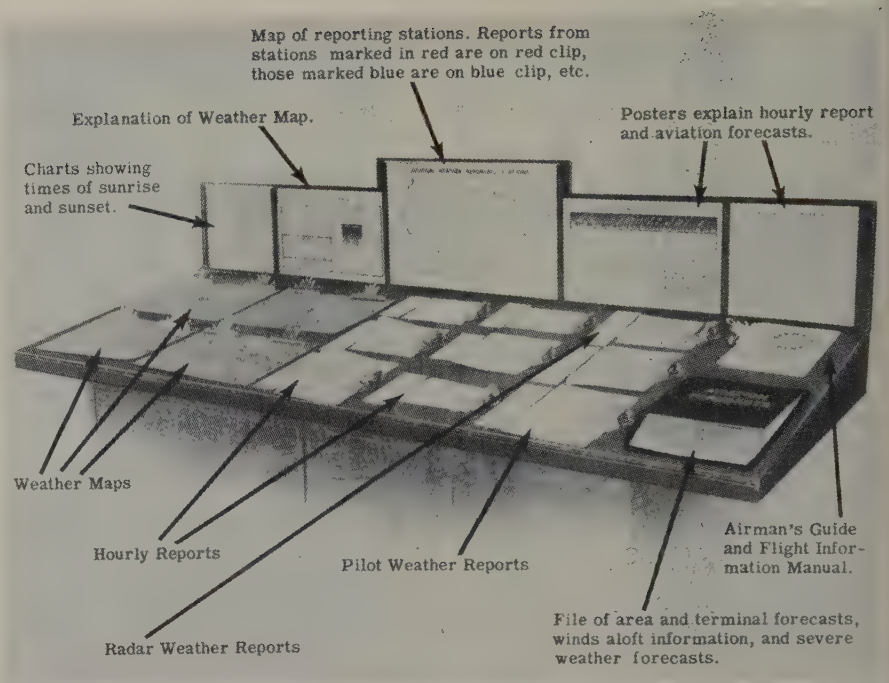
Captain Gough selected Joliet and Milwaukee as alternates, "One for Charlie (his co-pilot) and one for me," he said.

They studied the Upper Air Charts. Forecaster Selsmer called attention to the systems at the 500 millibar and 700 millibar levels.

They discussed the flight in terms of several altitudes for both weather and winds. Selsmer gave them a cross-section breakdown of cloud types—bases and tops, turbulence, temperatures and freezing level, and winds at each 5,000 feet level.

They moved to the Severe Warning charts and from there covered the PIREPS (Pilot Reports) and RAREPS (Radar Reports.)

No one will disagree that a lot of information was imparted on the briefing but more interesting was the fact that the length of time consumed was *less* than it takes to drink a hot cup



STANDARD *weather display for pilots will be appearing in more and more Weather Bureau airport stations. Designed for convenience, special posters explain how to read sequence charts. A simple system of color-codes makes it easy to find reports you want. A special folder contains the written forecasts and winds aloft information. Special charts tell you the time of sunrise and sunset at any place in the U. S. The entire display is arranged so that you can, if you wish, help yourself to needed information if deadline duties do not permit station personnel to give you personal attention.*

of coffee!

A sign over a jet pilots' Ready Room at a nearby Air Force base tells the story about treating weather casually, "*What You Don't Know Won't Hurt You—It'll Kill You!*"

One thing about a pilot's weather briefing—it is not as simple to understand as that television girl makes it, but it doesn't require a college degree in Physics to understand what is being said. The forecasters keep their discussions easy to understand and as short as is necessary.

When Captain Gough walked out of the weather office he was like Thursday's man, Friday. He had "the facts and nothing but the facts" which, by the way, enabled him to save a few hundred pounds of petrol, too. Choice of higher altitude was considerably faster.

Weather information doesn't end on the ground. After takeoff the pilot has a veritable encyclopedia of constantly changing conditions available not only by simply tuning in CAA range stations but also by specifically requesting the latest weather trend on VHF.

Mark Twain said, "Everyone talks about the weather and no one does anything about it." For the pilot who keeps his earphones "frying," that is just fine.

U. S. Steel's Jim Richter makes it "S.O.P." to "monitor weather chatter all along the route. Weather changes too quickly not to sit right on top of it."

Pilots can give the weather forecasters a helping hand too. After takeoff he should get a reading as he passes through the base of the clouds and note the tops. He should relay it to the tower. Enroute, any weather deviations from flight forecasts or significant phenomena such as temperature, cloud formations, icing and turbulence should be reported at the first communications opportunity.

"Why not?" says Captain Orlin Sorenson of Union Oil in Los Angeles. "The PIREPS I got were from pilots who took the time to pass it on. Don't keep it a secret—pass it on!"

Before the pilot closes out his flight he should make visiting the Weather Bureau for a "brainwashing," or debriefing just as important as making sure maintenance items are taken care of.

Let's listen to Ed Gough on "getting the works."

"They say you can't take it with you but here is one thing you *can*. It means dollars and "sense" and can save delays and maybe a handful of rivets. Get the works, weatherwise, whenever you can and give it your undivided attention!"

Keep Instrument Flight Clearances

CAA recommends that copies of all instrument flight clearances be kept for a minimum of 30 days in case of question or investigation into an alleged violation. The reason for the 30-day limit is that the records in towers and centers are kept for 30 days.

Jets Like High Altitude

The principal reason why the subject of pressurization enters into every discussion of transporting passengers by jet aircraft is that the jet doesn't come into its own until it up in the altitudes that require an artificial atmosphere for human beings. Jets by nature "like" high altitudes, and fuel consumption can be reduced by about 17% by flying at altitudes of 30,000'. Increases of range are natural. At the symposium presented for NBAA by the Air Force it was pointed out that the Cessna T-37 at 5000' has a range of 535 mi., but this shoots up to 780 mi. at 35,000'.

Pardon Us—A Correction

In the General News Dept. of the Mar. 1957 issue a Sikorsky S-55 helicopter used as a "burro" for modern prospectors was incorrectly identified through a typographical error.

Narco VHF for 80 USAF Cessna 310's

The Narco Sapphire 1016 VHF communications unit has been specified for the 80 twin-engine Cessna 310 aircraft recently ordered by the Air Force. The order for 1016 units and spares amounts to $125,760. The 1016, a unit with 360-channel transmitter and 560-channel crystal-controlled VHF receiver, meets CAA TSO for airlines.

The Black Hole

(Continued from page 11)

a height gauge. Information is obtained from the visual presentation afforded by the runway edge lighting and dynamic appearance of runway surface texture below the aircraft. As altitude is lost from the threshold crossing height to landing height the runway edge, as determined by lights, moves upward and outward. Simultaneously the spacing between lights appears to close. These features, together with the *increasing flow* rate of any discernable texture of the landing surface, are the primary aids in judging height over the runway. Secondary assistance is provided by reference to items that may be visible outside the landing surface boundary. These objects are in the pilot's parafoveal visual field at this point, because his primary visual attention is ahead, and any visual significance of these objects in the landing operation is of minor importance. (I believe it was originally noted by Capt. Majendie, then with BOAC, that the eyes of a pilot during the final flare and actual touchdown employed no saccadic* movement but instead stared directly ahead. This was later explored and confirmed by several research organizations specializing on the landing of aircraft and became known as the "stare period.")

Distance — Visual distance signals are a definite need in low visibility operation. The principal uses of this type of indication are:

(1) Constant assessment of visual range, particularly during final flare-touchdown and initial landing roll.

(2) Definition of landing direction limit of touchdown area.

(3) Definition of the upwind end of runway or proximity thereto.

From low visibility landing test work, the level of difficulty associated with a normal landing rises abruptly when the runway visual range on a 200′ wide runway decreases below approximately 1900′ and on a 150′ runway when the RVR goes below 14-1500′. In both of these cases the angular spread between the lights on the runway edge at the extreme visibility limit is a little more than 5°. [*Table 1*]

Low visibility landing test work has shown inadequacies of elevated runway edge lighting, under conditions of light to moderate fog, in providing elevation information or even sufficient visual clues to provide any definition of runway surface plane for final flare and touchdown.

Several items of importance are apparent from D and E above.

(1) The area of foveal vision when the eye is focused on infinity is 5° or less.

(2) There is no fixation point at the place where the pilot wants and needs it, i.e., the continuity of "X" (runway center line).

(3) Under the conditions described in D and E, the main visual assistance is derived from the parafoveal streamer vision and this in itself is abnormal to the pilot because normally he has and uses both visual fields.

Visual Height Guidance — As explained above, visual height determination is from the perspective determination of the geometry of the runway pattern which the pilot has learned from experience. Under low visibilities the runway pattern was not visible in sufficient time or detail to make flight path corrections and still have enough runway to land and stop on. This was the principal reason for approach lights and of the many configurations tried, the successful ones were those that carried the principal geometric elements of the runway pattern out into the approach zone. The centerline and crossbar systems do this and the visual information is instantly obtainable with no time lost in the pilot's visual interpretation.

The average angle of present day electronic instrument approach slopes is 2.8°. As mentioned in #3, the average angle of observed visual approaches by random "T" category aircraft was also 2.8°. The instrument and visual paths apparently coincide but in actuality, while both have the same slope, they terminate at different points on the runway. The instrument approach slope terminates approximately 1000′ down the runway from the threshold and the visual approach slope terminates on the runway side of the threshold.

Why do pilots normally undercut the glide slope (both electronic and visual) under poor visibility? Generally speaking, pilots adhere to the electronic glide slope until the visual approach or landing aids come into view.

If a sufficient segment of the visual aids is available the complete transition from instrument to visual flight is made. The localizer and glide slope are of no further interest or concern.

If, for any reason, an adequate visual segment is not available or insufficient guidance elements are present within the segment, the approach is then or very shortly thereafter abandoned and a missed approach procedure initiated. In either case, the electronic glide slope is of less than academic interest, under these conditions.

The best way to assess this condition is from experience and observation of other pilots making weather approaches. As stated previously, the normal visual approach angle is 2.8°, and anything above or below this reads "TILT" to the pilot and he endeavors to correct his flight path accordingly. Under reduced visibility and after becoming visual the pilot will have a minimum segment of lights to proceed on. He will have the elements of Identification, Direction and Roll Guidance, but his height assessment is incomplete if the angle of the extreme forward limit of his visual field is greater than 2.8°. At this point his visual picture reads "TILT" insofar as height judgment and he will *decrease altitude* accordingly. Some idea of the relationship of the 2.8° slope and various visual ranges are as follows:

Visual Range	*Altitude*
2000	98′
1800	88′
1600	78′
1400	68.5′
1200	58.6′
1000	49′
900	44′
800	39′
700	34′

Under visual ranges of less than 2000′ the pilot may become visual well out on the approach system and lose altitude until he obtains maximum height sensitivity which will be somewhere near the figures quoted above. At this point the flight path descent is checked and aircraft flown in on top of the lights. This is a perfectly safe procedure as long as pads of speed or power are maintained.

The Achievement of the Required Visual Guidance on the Runway— The proposed configuration, when examined under close scrutiny for each of the desired elements, has each element in sufficient detail and repetition to allow safe visual operations to exceedingly low limits. Examination of each element follows:

Identification—The closely spaced double rows of bars form a positive break in configuration. Over the approach zone the pilot corrected or held his instrument flight path alignment by closing on and holding the extended centerline of the runway as defined by the approach lights. With the proposed configuration, the centerline is continued from the threshold plus 3,000′ by the negative centerline indication between the parallel rows of bars. This break in centerline information from positive to negative leaves no doubt that *this is* the runway. This is particularly important in operating in the lowest visual ranges where the visual transition would occur very close to threshold.

Alignment—Obtained easily from the negative indication of centerline. The foveal visual field when centered on the maximum visibility limit (in this case let's assume 12-1300′ slant range) covers an area embracing both linear light sources and due to the tangential angle of the visual axis and the runway surface, the surface area covered by the foveal visual field will extend from 500′ ahead to the horizon. Without the addition of the runway narrow gauge lights there is nothing in the area of foveal vision to fix on and this has undoubtedly contributed to the definition of this area in a low visibility landing as the "hold off and hope area."

Roll Guidance—This is easily maintained by easy-direct reference to horizon continuity formed by the paired transverse linear light sources. It makes lateral stability reference a simple reading while in the flare and touchdown stages of landing. With the present type of runway lighting, information of this type is deficient at best and under lower visibility conditions,

**Saccadic movement: a quick movement by which the gaze is transferred from one fixation point to another.*

non-existent.

Height Guidance—As explained earlier the features of the normal runway geometric pattern that a pilot uses for height guidance are vague and diffused under the lower visual ranges for the reason *that what he can see is not located where his aircraft will traverse in the next few seconds.* The precise definition of runway surface plane, which is required for accurate visual judgment of height, for final flare and landing, is lost. He has no visual aid. With the proposed configuration, he has a solid height gauge, mainly the apparent increasing separation of the two rows of linear bars as he descends plus the apparent flattening or closing of the distance between bars. Under normal visibility he has this picture on a larger scale. The proposed configuration will supply this scale in the reduced visual range area and also provide adequate, textured, runway surface plane marking.

Distance—This type of information can best be interpreted in the proposed runway treatment by the ending of the guidance elements at a specific distance (3000′ from runway threshold) to avoid the use of added elements for pilot distance interpretation. Definition of the upwind or far end of the runway will generally be accomplished by viewing elements of visual aids used primarily for the opposite direction approach.

Accident Report

(Continued from page 28)

At the time of this accident Pilot Mulherin had a total of 9 PV-1 flight hrs., all in the subject aircraft. This 9 hrs included his rating checkflight with a CAA inspector, which he passed satisfactorily.

Analysis

The final message from the aircraft was at 1034, 4 min. before the crash, and gave no inkling of trouble. We must, therefore, assume that Pilot Mulherin was not in any serious difficulty at that time for if he had been the tower undoubtedly would have been so advised.

It appears that after starting the instrument approach, the left engine lost all but idling power. The left carburetor idle control valve linkage fork must have suddenly become disconnected, without warning, at this time. It would normally be at about this time that power changes (throttle movements) would be made and the aforementioned bolt could then have come out. What may well have happened is that Pilot Mulherin changed throttle settings, experienced a sharp yaw to the left due to wind-milling of the left propeller, spent the next several seconds trimming the aircraft to offset the resulting drag, and then attempted to determine the trouble. During this short and critical period, to continue with the premise, and at low altitude, the speed of the aircraft continually decreased until control was lost as it struck trees and then dived into the ground.

As stated, the left propeller was found not feathered. Examination of the feathering mechanism of the impact-damaged propeller revealed no indication of malfunction or failure. Functional tests of the mechanism of the left propeller's feathering system could not be made. It is possible that the propeller could not be feathered because of a malfunction in its feathering system. However, it appears that there was barely time—if indeed there was actually enough time—in which to evaluate the situation and then feather.

When the idle mixture linkage became disconnected it appears reasonable to assume that the resultant leaning effect could very well cause erratic sounding engine operation, particularly if throttle movement was resorted to by the pilot in an attempt to restore power.

The fact that the left propeller was not feathered is resolved around two possibilities: One, that a malfunction in the system existed prior to the accident and impact damage precluded any functional testing of the system; and two, that the flight crew did not recognize the need to feather the propeller since the left powerplant instrumentation indicated a near normal engine operation.

Mulherin, although a pilot of long and diversified experience and fine reputation, was nevertheless relatively inexperienced with the subject airplane. The large, open field directly and immediately ahead of the crash site suggests that he may have made an attempt to reach it in lieu of the airport.

Findings

On the basis of all available evidence the Board finds that:

1. The aircraft and the crew were properly certificated.
2. Pilot Mulherin was relatively inexperienced with the subject model aircraft.
3. The left engine suddenly lost all power because of a disconnected carburetor control.
4. The left propeller was found not feathered.
5. Examination of the right engine revealed no significant defect.
6. Altitude could not be maintained and the aircraft struck high trees and then plunged steeply to the ground.

Probable Cause

The Board determines that the probable cause of this accident was a critical loss of altitude, due to a complete power loss from the left engine and the drag of its windmilling propeller. James R. Durfee, Chan Gurney, Harmar D. Denny, G. Joseph Minetti.

Flight Personnel

R. A. Mulherin, age 54, held a currently effective airman certificate with an airline transport rating and type rating for the PV-1. Employed by the Crane Company since Aug. '50, he was the Co.'s chief pilot. Mr. Mulherin's pilot experience was both extensive and diverse, totaling some 17,600 hours. The record indicates that he had flown 279 hours during the previous six months, 44 hours during the previous 30 days, and three hours and 30 minutes during the preceding 24 hours. His last physical examination, on Mar. 23, '56, was satisfactory. Mr. Mulherin's pilot experience on PV-1 aircraft totaled only nine hours, all on the subject PV-1. This nine hours included his being checked for the type rating, only shortly before this accident.

Robert H. Robinette, age 28, had been employed by the Crane Company since Oct. 1950. His total piloting experience was 2,297 hours, of which 29 hours had been in PV-1's. His time in the last 90 days, 30 days, and 24 hours was much like that of Mr. Mulherin. Mr. Robinette's last physical examination on April 5, 1956, was satisfactory. He also held a currently effective airman certificate with an airline transport and other pertinent ratings.

The Aircraft

Lockheed PV-1, serial number 5326, N 64001, was built as a military aircraft and was converted to the executive version in June 1949, by the Flying Tiger Line, Inc., at the Lockheed Air Terminal, Burbank, California. The aircraft was purchased by the Crane Co. in March 1956 from the Columbia-Geneva Steel Corp. Records indicate that its total time in the military service was 281 hours, in the service of the Columbia-Geneva Steel Corp. 2,795 hours, and in the Crane Co.'s service 33 hours. Engines were Pratt and Whitney R-2800-31.

Skyways Round Table

(Continued from page 16)

a big airplane. A small long-range jet is very difficult and expensive to build. It must cruise at 550 mph to afford a reasonable time saving, face aerodynamic and structural problems of high speed, cruise at 30,000', carry a lot of fuel, and have certificatable runway performance.

"Between these two extremes—aircraft traveling 300-800 mi. and ranging in size upward from the DC-3—is the turboprop.

"The business plane user wants speed, a smooth ride, and no anxiety about flexibility and fuel. For comfort, either the turboprop or the pure jet gives fast climb over weather and lack of vibration. The pure jet is faster, but a speed advantage of 150 mph means only 20 min. on a 500 mi. trip, and by our reckoning that 20 min. will cost a lot. Direct operating costs of a pure jet, even at airline utilization of 2000 hrs. per yr. or more, is from 10-30% higher than for turboprop.

"Regarding Mr. Brown's statement on high speed for low cost, we consider it axiomatic that all significant speed gains are expensive. Many business flights consist of a trip from A to B, waiting, then returning from B to A. A cut in enroute flying time between A and B would result in lower flying hours per job, meaning reduced utilization and increased permi. costs."

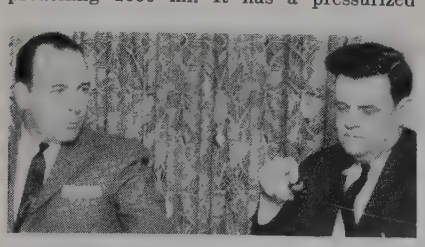
Pague: *"Any other comments on the availability of turboprop or turbojet aircraft in the near future?"*

Gordon *(Beech):* "Beech is considering offering the MS 760, the French jet, commercially, perhaps this year. The airplane is in the final stages of CAA approval. It is now in production, which makes it possible, for the first time, to offer a jet commercially. It is essentially the same airplane that toured this country, although we've made some modifications."

Carrell *(Chamberlain):* "What can the jet do for the modest sized corporation? How can it be utilized advantageously?"

Pague: *"Jerry Gordon, you people have investigated this matter. Will you add something?"*

Gordon: "The small jet will permit many companies to become familiar with jet operation before trying it with large jets. The high speed and greater utilization of the small jet will have lots of appeal. It would fit extremely well into the larger business fleets, and would make practical trips of 600 mi. with return the same day. With development the plane will cruise at about 400 mph with a useful range approaching 1000 mi. It has a pressurized cabin, dive brakes, and all the things required to make an operational jet aircraft. We flew close to 443 hrs. during 4½ months in this country, carrying 2126 people, and we found no problems in jet operation that are particularly different from first class operation of any other airplane. We checked out many pilots, and flew under many different conditions."



CHAMBERLAIN *Aviation was represented by Pres. W. B. Carrell (l) and Gen. Mgr. Jack W. Hale. Chamberlain's Akron operation features installation of CAIR radomes for business aircraft radar.*

STEVE BROWN *listens while Norman Beuter describes the "chain reaction" congestion created by one aircraft holding.*

BROWN *says some holdings are unnecessary. "Passengers would rather hold for LaGuardia for 45 min. than land at an alternate."*

Pague: *"Skeets, will you carry on a bit further?"*

Coleman: "The jet doesn't seem very close to reality for the modest sized corporations. By 'the nature of the beast' the jet is expensive, and I don't know of anyone who is making a jet available to that market. With engine prices what they are, I think it is going to have to work from the top down. To a man with a small plant in Racine and one in Baltimore, it would be an expensive venture."

Gardner: "Where there is no bonus of competitive impact or high load factors the slow twin-engine piston transport is cheaper than the fast 4-engine turboprop. However, the mile-cost difference isn't so great. ATA figures for US airlines show C-46 plane-mile cost is 62.63¢, Convair 240 is 64.75¢, Viscount 69.39¢, Convair 340 76.03¢, Boeing 377 158.24¢; these figures are subject to many outside factors, but give a rough idea that 4-engine turboprop and twin-engine piston operation aren't poles apart."

Pague: *"The cost of jet aircraft undoubtedly becomes rather high due to the type of engine. Perhaps Mr. Turner will tell us about GE's plans for producing a small jet engine."*

Turner *(General Electric):* "In considering the cost of the small jet we must look into the future. We have built the J47 in large quantities. We know what we can do cost-wise on quantity production. Providing there is sufficient demand to warrant high production, we see no reason why, in the future, the small jet or the small turboprop should cost much more than a piston engine of comparable power.

"The cost of the small jet engine, in dollars per pound, does not come down in proportion to size because you must then produce small parts on a high precision basis. This presents some problems, but with new techniques that are being developed we predict a breakthrough within a few years."

Snow *(Continental Aviation):* "The small jet engine of today is pretty much patterned after the large jet, which has kept its cost inevitably high. We have several designs in the turboprop or shaft turbine area, and by utilizing such things as precision casting and forging techniques, which seem to indicate the possibility of reducing costs and eliminating many complications in the machining of engines, we may provide a comparatively cheap power plant which, on the cost per unit output, and even on cost per pound of engine weight, shows promise of bringing the turbine down within the realm of the piston engine. As yet, fuel consumption and operating costs tend to remain high, but they are coming down to the economy of operation that you expect from a high-performance piston engine. However, that will depend on a need developing, and also on special aircraft designs around such an engine.

"A large demand from the customer is required to get into the high production area, so that the rather high tooling costs can be amortized over a large number of engines. Transferring the cost from the labor and the time-consuming machining operations into the type of tooling that we used for the production of these engines, permit manufacture of an engine that will give good performance with low unit cost."

Herman *(Fairchild):* "We've had some experience in the last 5 or 10 yrs. in the manufacture of small turbojet engines which will be applicable to business aircraft. However, the state of the art of jet propulsion seems to be stepping ahead in its plans of performance over what is currently required of jet operation. With this advance in technology we're getting into more complex machinery. If you reduce

the overall size and weight of the power plant, you do not necessarily reduce complexity; in fact, the precision requirements today are even more constraining than they are in the larger aircraft. However, with attention being given, in the design and development stages, to ease of maintenance and reliability, we will have power plants which will be satisfactory in every respect for the users of business aircraft. Maintenance techniques will be slightly different, and the mechanic will have to be a bit more of a specialist, because he will be faced with the adjustment of some very fine machinery. This will be based on experience gained in military applications prior to its introduction into the commercial field."

Pague: *"It would not seem that very much is being done in developing a new aircraft utilizing turboprop engines for the commercial aviation field. There has been considerable comment by business aircraft operators that a more practical step for new high-performance aircraft would be the application of the turboprop as power. If for no other reason, the matter of the passengers' reaction to the straight-jet-powered aircraft is a highly important factor.*

"Does anyone wish to comment on this statement?"

Jamison *(General Electric):* "Engine manufacturers, including GE, are developing both turboprops for aircraft and turboshaft engines for helicopers. These engines show promise of giving us operating specific fuel consumption down in the SFC range of high-powered piston engines. We are giving them full consideration in our work with the military services and our planning with the aircraft manufacturers. We see a need for both types of engines in the services, and the successful development of such power plants for the military will lead to eventual application in the commercial and business fields."

Pague: *"Let's discuss the operational problems of the jet age."*

Coleman: "To go back to Mr. Carrell's point about the modest sized corporation, I think I may have used a poor example by picking on the engine. If we are talking about people who use airplanes like the Twin Beech or Aero Commander, then the small jet is not just another airplane. The skyrocketing costs begin with pressurization at high altitude and strength for high speed load factors."

Turner: "Isn't that an opportunity for the charter companies to serve the smaller businesses? Much of this is done right now. I see no reason why, in the future, this pooling of equipment might not serve to avoid the high initial investment for the smaller companies."

Pague: *"Col. Love, does the Air Force have any plans to use the light jet transport?"*

Col. Love *(USAF):* "The Air Force has a requirement for small jet transports, but at this time has not received approval to develop or procure this type aircraft. However, if such approval is granted, the AF intends to purchase these aircraft on an off-the-shelf basis."

Snow: "The intital breakthrough very possibly is not going to be in the jet field. If you apply a turboprop engine as it is presently known to some existing light aircraft, you can realize some startling improvements in performance because of the low weight and the low volume of the engine. Possibly for the small corporation the turboprop will be the answer. It will increase their block speeds on short hops, the initial cost will not be nearly as high, and some of the airframe manufacturers may be able to modify existing designs to make available a turboprop engine in the small horsepower range. There's also the possibility of the ducted fan, which offers the lowest specific fuel consumption for the amount of thrust that it puts out. Maybe the ducted fan could be adapted to existing turboprop designs. Jet assist units also increase performance and safety. We might build up our experience until we reach the point where the large corporation, which can afford the maintenance requirements, are using these large aircraft engines; the small company is going to have a comparatively easy time moving in through the 'back door' in turbine operations by using small, inexpensive turboprops similar to today's piston-powered corporate light planes."

Pague: *"In the matter of Aircraft Operation, Major White, I'm sure you can enlighten us on crew requirements in piloting jet aircraft."*

Dr. White *(USAF MC):* "The problems that are involved with crew or passengers are, I think, basically the same ones the Air Force now has. There is no problem we're aware of that is not solvable. The resolution of these problems is based first upon recognition of the problem and, secondly, working out a solution. I

PHYSIOLOGICAL *aspects of high-altitude jet travel are explained by Dr. White (left center) while (l to r) Steve Brown, David Jamison, and James S. Herman listen in.*

should think that the number of crew members would not increase from what you are now planning to use. The problem of ageing is possibly a new area that is being more acutely regarded by business operations. We should keep in mind that it is physiological ageing, rather than chronological, that is really a more accurate indicator of a man's status.

"With low speed, low altitude aircraft, you have had a certain speed of function in flight, and without increasing your crew you will have to work at a faster tempo, with faster speeds and with such things as fuel becoming a mounting problem as you go along.

"The speed of your flight is going to be reflected in your man. When BOAC tried to transition reciprocal crews to jet flying, they learned that if a man arrives at a physiological age of about 40 or more, and this is his first experience, it takes longer for him to be transitioned. In addition, an increasing percentage of them did not want to continue transition training once they had gotten into it.

"Operating at higher altitudes, you get into the problems of hypoxia and decompression. They found in their physiological training that the 'bends' became a problem if a man were exposed to altitudes above 30,000' for any length of time. They established that the resolution of the 'bends' problem was rapid and progressive descent to an altitude below the 'bends' ceiling, which in the normal individual varies around 30,000' but sometimes as low as 18,000. They decided in the hypoxia situation that at least one crew man should be on oxygen, and the remaining crew men should have their oxygen masks in ready position. They felt that it was important in the design of the aircraft to have prominent warning devices, to indicate a malfunction of the home environment in the aircraft.

"They also found that the general concept that a man with experience can make up for an inexperienced younger man becomes fallacious when carried beyond a certain point. Even his experience will not make up for his slow reaction time. Studies of the Air Force population also indicate that if your early flying habits were not good, and you have attempted to correct them, that you will revert to your old habits in an emergency situation. This is especially important when rapid and accurate decisions and action are required.

"You people have one physiological problem more difficult than what we would have. The Air Force population is relatively younger, better controlled physically and in training. You will have to be more certain that your cabin is safe, that your personnel are familiar with emergency procedures. Your passengers should be familiar with emergency gear because the crew is going to be busy bringing the airplane down and they aren't going to have time to take care of passengers who have not been informed."

Pague: *"Dr. White, would a pressure suit be necessary?"*

Dr. White: "No special clothing would be required in any operation that I've heard proposed for business flying, as long as you stay below 45,000', particularly if you can provide good temperature control in your cabin. With reliable pressurization, any oxygen system would be for emergencies only. You must assume that you need a reliable cabin for pressurization.

"These points apply more critically to passengers, because as crew members you have a regular physical which your passengers may or may not have had."

Col. Love: "I would like to apply something Dr. White has said to an operational situation. When the Air Force started jet operations 15 yrs. ago it was participating in a relatively hazardous venture. After 15 yrs. we now have 100% jet combat fleets, with much higher performance than in the old propeller regime. The safety record of jet aircraft in our operational units is better than that which we experienced in comparable propeller aircraft. This includes all types: fighter, bomber, and trainer. It was accomplished by adhering to the new laws after the medical people identified physiological hazards and told us how to operate in the new flight environment. New methods and techniques had to be developed concerning pilot and tactical operations. Adherance to these laws and techniques produced a *safer* operation than we had experienced with propeller aircraft."

Dr. White: "I can give an example of identifying a hazard and then solving it. One of the requirements for take-off was that as the pilot cleared the ground and got ready to clear from the tower channel into monitoring and listening to 'air ways,' he had to change his channels. In one aircraft design the channel selector was behind the pilot's right shoulder, and he was required to raise his arm, look under it and punch the button. This required him to change hands on the stick, and change his position in the seat so that one wing dropped if he were holding the stick. Since he was at about 1000' at this moment the next thing that happened, at the speed he was making, was that he hit the ground.

"It became a matter of identifying what was happening, moving the selector to where it was more easily reached, or changing the procedure for switching channels until he was at a safe altitude. If you continue this process in your entire approach to the issue, you can resolve any of these situations."

Pague: *"Skeets, do you have a question?"*

Coleman: "If jet aircraft are so smooth-handling, are we going to be faced with the same kind of relearning problem that faced the older pilots, or are they going to find that this is a tool that fits in better with their existing habits than the old propeller-driven aircraft, which had tremendously different handling characteristics in different configurations? They were equipment that was not designed from the human factor standpoint."

Dr. White: "The key word is the human factor. I think you can reduce these problems to a minimum if you use proper approaches in the design of your aircraft, from the time of its original conception.

"In answering the other question, a man's previous flying experience will decide how difficult transition will be for him. If he has been flying a Twin Bonanza and suddenly changes to a jet he would have considerably more difficulty in transitioning than if he had been flying pressurized equipment, because the environment is at a completely different level. If his experience is with a Convair, the transition will be shorter and easier because of the problems of navigation, etc. Experience in low-altitude VFR flying would make high altitude IFR flying difficult to learn quickly."

Turner: "I wonder if the Air Force would comment on work being done to simplify instrumentation."

Col. Love: "The age of jet propulsion has caused the Air Force in particular, and other branches of the services, to really consider the human being—the man in the cockpit—with much more emphasis than for propeller-driven aircraft. We used to think we could put instruments into a prop airplane without too much care about correct location. With the age of jets, however, we've come into a very scientific approach in making sure the pilot expends minimum mental and physical energy in flying his machine. It has paid off. Human factor endeavors have greatly advanced the safety we have achieved in jet operations."

Pague: *"Don Teel, your organization is getting into turboprop operation. Have you people given any special attention to crew requirements?"*

Teel *(United States Steel):* "We have been planning for this for quite some time. The majority of our crews have had jet experience. We do flight planning now the same way we expect to do in the advent of jets, following instrument flight rules, and we expect no difficulty at all.

"I would like to ask Col. Love if he doesn't feel the instrumentation program

was not just as important in piston aircraft. If we had had it, we might have been saved a lot of trouble; it should not have been saved exclusively for the jets."

Col. Love: "I agree wholeheartedly; aviation, as we know it today, came of age in an extremely short time. With the tremendous acceleration which aviation got during WW II, we had to use 'cut and try' methods to get the job done quickly. When we finally had a chance to view this thing in retrospect, the jet age came along, and we saw that we had to have more scientific approaches toward the instrumentation problem. As Dr. White said, cockpits had to be designed so that pilots didn't have to twist and turn, and perhaps throw their aircraft into dangerous attitudes, in order to manage their flights.

"The jet age has caused the Air Force and its jet pilots to think about what's going to happen before it happens; that is, *flight planning*. There is a tremendous premium on flight planning. It's a much more serious business than it was in the days of propeller-driven aircraft. But with this serious flight planning comes, of course, the terrific payoff: *safe* aircraft operation. When one pays proper attention to flight characteristics, cruise control, navigation techniques, and the flight regime, the jet has repeatedly been demonstrated to be safer than the propeller airplane."

Pague: "*Ralph Harmon, do you wish to add something about pressurization and the physiological requirements of crew and passengers in terms of Cessna's new 620?*"

Harmon *(Cessna):* "I think we will be able to integrate the 620 into business aviation and the use of pressurized aircraft without any particular problems. Other than that, it's a normal evolutionary process, and it will be a useful machine while we are solving some of the problems of getting into the jet age.

"The reason we selected the piston engine for the 620 is rather obvious: there simply are not other suitable power plants available within the price and performance brackets compatible with present business airplane requirements."

Pague: "*As mentioned, we know that a small turboprop engine is not yet available for the 620. Would you care to comment on your future plans for augmenting the 620 with turboprop?*"

Harmon: "We took a good look at the turboprop possibilities when we started the aircraft, and we continually watch it. The gentlemen in the room call on us regularly whenever they get significant performance improvements in turbine engines, but we think that until we can install turboprop powerplants in an airplane like the 620 without sacrificing any of the performance characteristics that we now have, we won't have too salable a product. We cannot sacrifice range, altitude performance, endurance, or some of the other factors we have to use in our every-day business. They can be installed, and they can be made to operate, but we have to look at all the factors that have been discussed in this meeting and at the Symposium, and integrate them into a package. We can't leave anything out. It'll take a while."

Gordon: "The turbine engine, either turboprop or turbojet, is the real future of this business: it offers us speed, utility, and all the other things that people find worthwhile."

Snow: "With a jet aircraft being so quiet and smooth, is the pilot possibly lulled into a false sense of security which slows him down mentally, like a driver on a turnpike?"

Col. Love: "No; probably just the reverse. When I first checked out in a jet airplane, by the time I got out to the runway I was sure that I'd forgotten half the things that I should do to prepare for takeoff, simply because there weren't as many

MODERATOR *Walt Pague asks Dr. White whether the pilot of a subsonic jet would be required to wear a pressure suit. Dr. White replied that no pressure suit would be necessary, but that reliable pressurization was a must. Other panel members shown (l to r), Thomas A. Davis, Robert Snow, W. B. Carrell, Jack Hale.*

things to do to get the plane ready to take off. I believe the pilot gets keyed up knowing that he's got a faster machine, but human nature takes over and tunes you into your new environment pretty well."

Dr. White: "Also, while you're airborne in a jet, checking in at check points, figuring your ground speed, wind graph, and so forth, occur more rapidly, in which case the tempo of the pilot's performance will not let him start sleeping at the switch.

"The simile to the turnpike is a good one, however, because in altitude flying it's quiet, you're remote from the weather, and you lose a sense of speed unless you plot it on a map."

Col. Love: "Having flown both types, I have found that in flying a jet airplane from A to B, I arrive at point B much more refreshed, much less tired and weary than I did flying a propeller airplane from A to B. You're above the rigors of the weather, get a much smoother ride, and of course you're exposed to the trip for a much shorter period of time, and the handling characteristics of the airplane are nicer than a comparable propeller airplane."

Teel: "This would also be true for an executive type jet aircraft, wouldn't it?"

Love: "Yes."

Carrell: "During the last war we had some difficulty in getting students in combat training to take seriously their altitude familiarization flights, in which they went individually to 30,000′. We found them cheating a lot. Do you find much fear among pilots and passengers on this altitude thing?"

Dr. White: "The Air Force did, and I am sure a good number still do. However, in the Air Force fears are alleviated through a mandatory regulation which states that all people who are exposed will be indoctrinated. We had to look at our indoctrination program rather critically to determine whether we are creating fear or educating them on the facts of life at high altitudes. Our program has been reorganized since WW II to get across the education angle, and follow it up with periodic refreshers. In general, after the original indoctrination in high altitude flying, the gross areas are not forgotten, such as use of oxygen above 10,000′, that 'bends' occur at a ceiling of about 30,000′. Although certain things become firmly entrenched, the 'little things' are forgotten without occasional reminders, or if their importance has not been stressed properly. For example, you have to remind a man that a leak in his mask will change the ceiling that the regulator is putting out.

"To summarize, we decided that all of our people would be trained in the basic physiology of high altitude, and that annual refreshers for jet operators would be given at which time the effects of hypoxia would be demonstrated on the men themselves. It can be very vividly demonstrated by giving a man a graded card to read. At 15,000′, without a mask, he can't see the card; by just giving him the mask, he can now read what is on the card."

Col. Love: "There is another practical aspect of this problem of cheating on high altitudes. It's going to be very difficult for the fellow who's got a jet airplane with, say, a 500 mi. range on the deck and an 800 mi. range at 30,000′, to go 700 mi. and cheat."

Dr. White: "You can't cheat any more because high-altitude traffic is monitored. This is a good thing; if you get blown off course they can help you get back on, because they know where you are better than you do."

Coleman: "Let's see if we are in disagreement or not. When you get up to 50,000 you are in a new world of danger, where anoxia and decompression take on new meaning, and you feel like getting down. I think that the area of worry has changed. At 50,000′ you are not worried about performance so much, but the critical human environment."

Col. Love: "A fellow who says, 'I would rather fly at 15, and tell them I was up at 30,000′, if he is flying a jet airplane, won't get from A to B by flying at the altitude he likes; he's got to go up to the proper altitude to get the range."

Coleman: "We don't usually worry about things below 45,000, but above that you have that 'worry area.'"

Dr. White: "45 or 50,000′ is an entirely new environment, an area where conventional oxygen systems give way to other protective techniques."

Carrell: "Will we have to restrict passenger movement in the cabin?"

Dr. White: "That is something you are going to have to decide. A rapid rate of descent is desirable, so you have a high placard speed. You must decide what the chances are of having this occur, as opposed to the chances of having one of your passengers loose in the cabin, where he becomes a missile rather than a seated passenger who's just excited. If you are going to have passengers moving around in a cabin of any size you have to think about having a plug-in for a bottle for them to use if the airplane should suddenly start coming down at rates of 10,000 or 15,000 fpm. This is particularly true for the rest room facilities on the aircraft.

"This is a problem you must tackle straight-forwardly, and recognize that if you don't have safety belts on everybody and don't provide masks you will be running a certain risk."

Carrell: "I wonder if we may not have to re-educate the owner that his airplane is no longer a flying office, but strictly a piece of transportation."

Brown: "I think we are being realistic in believing that the more slowly you fly, the larger are the requirements for cabin space. It's nice to have headroom if possible, but nobody can get up and walk around in a limousine, and sometimes you're in a car for an hour getting to and from the airport."

Coleman: "The average corporation flight is about an hour long, which is not too long to expect a person to remain seated, particularly if it's safer to stay in one seat with a mask handy."

Dr. White: "That's a very good point."

Coleman: "The Air Force referred at the Symposium to CAA figures that there were some 50 decompressions in the 1st quarter of '55. Does that refer to reliable statistics? Where does this information come from?"

Dr. White: "Those figures, from the CAA Medical Lab at Ohio State U., were further broken down to show that ⅓ of them were involuntary, and the other ⅔ were strictly voluntary."

Coleman: "What were the physiological effects on the passengers?"

Dr. White: "You must remember that the results I cited were on a flying group that never exceeds 25,000′, so this is the average. The involuntary 'dumpings' were caused by such things as having birds fly into the airplane. The voluntary ones occurred when the failure of a window was imminent, for example. Seemingly this, from what CAA has told us, stays at a relatively constant rate in the pressurized cabins now being used at 25,000′ or below. The events that we have cited physiologically for jet operation would not be the same, and you would have longer exposure to the hazards. Thus, the symptoms for jet operation are more severe because of altitude and time exposure."

Coleman: "If we arbitrarily set up our safety factors to have a quick-snap-on oxygen helmet available, and you restricted your altitude to below 35,000′, you wouldn't have a critical situation for your elderly passengers. What could you expect in light of what you already know of this?"

Dr. White: "Your average will be good. The important thing is to provide the helmet, provide enough oxygen for such a situation. Probably this could be done very easily."

Coleman: "A big difference between Air Force and business flying is that military considerations govern everything you do. If you should want to make a radio more accessible to the pilot, you may have to leave it where it is because it will tie up the position of the scope, or something. The biggest surprise I had, when I transferred from military to business flying, was to see that these people could take things like radio and radar and put them where we always wished they were in military aircraft."

Dr. White: "This we are learning slowly. If you use good sense at the start you don't have to redesign your instruments for size and shape. I'm sure our industry has learned from your experience in business flying."

Col. Love: "Many of these things could be solved by horse sense."

Coleman: "Sometimes you people can't act on horse sense, but the business pilot can, because we have mock-ups we can change according to criticism. We're interested in the little changes because we must have smooth flight, which isn't a military requirement. A business pilot must give the smoothest, quickest service, and he's had to organize his cockpit along that line. Our customers have tremendous enthusiasm. They say, 'I want an electrical system here, and put in new stuff here.' Their ideas seem revolutionary, but they're just common sense."

Col. Love: "During WW II the Air Force had to put a lot of combat equipment into the plane, and didn't have time to use as much horse sense as you have. We have since studied this more closely to make a weapons system that is comfortable and safe. There has been a fantastic increase in cockpit efficiency in 10 yrs."

Teel: "Col. Love, has any thought been given to automatic descent in case of decompression, using the automatic pilot to bring you down to a reasonable altitude?"

Col. Love: "I can't give you a specific answer, but with the state of automation we now have in all our jet aircraft, that is possible."

Teel: "If you get people down to a reasonable altitude, they will still be in good condition. Isn't that right?"

Col. Love: "Yes, they will survive, depending on the point at which you set your altitude. There are certain aspects of this problem that cannot be answered, so it has been shelved. How far are you bringing it down, for instance? This makes a tremendous difference, depending on the height of terrain below the aircraft. If you set the device for a descent to 15,000′ and you are over an 18,000′ mountain, it is just as disasterous as not having come down in time at all. There are a few things you would have to incorporate into this system to have it track height above the terrain, to avoid coming down into rock-filled clouds."

Teel: "As I understand it, at present, there are autopilots that you pre-set in your cruising altitudes, either down or up, and that minimums would have to be set in by the pilot as he goes along."

Col. Love: "Of course, another factor is having the conscious ability to crank in data for the automatic emergency descent in the first place."

Dr. White: "That should be carried in the device so that it automatically takes over."

Col. Love: "That would be complex, a safety on a safety feature."

Dr. White: "The essence of the problem is to provide the necessary emergency gear for the pilot, so if there is an emergency in the pressurization system of the aircraft, the pilot or the flying crew of the airplane have adequate emergency gear to bring the plane down to an altitude that is compatible to the passengers."

Col. Love: "This gives the pilot the prerogative of choosing a course of action. An in-flight emergency isn't necessarily a decompression, and the pilot has many alternatives, depending on the nature of the emergency. If the pilot feels that it is not a dire emergency, he may decide that he

can continue and put his passengers on oxygen. Proper equipment permits the pilot to decide what the course of action will be."

Pague: *"Bill Carrell, did you want to add something?"*

Carrell: "Skeets, will we always have the possibility of rapid decompression? Can't it be designed out, possibly at the sacrifice of performance?"

Coleman: "Because we lack experience, I think we are going to start at an altitude lower than our best operational altitude. We will work up to the best economical altitude, building our faith on our operational record. I think pressurization will be acceptable. I have had very little go wrong with mine. Col. Love, how are your rates of descent and ascent in jets?"

Col. Love: "When the initial F-80's came out we couldn't use its pressurization system for a while. It had all the troubles attendant to untried systems. However, we were used to 30,000' altitudes in propeller aircraft. P-51 pilots would cruise at 30,000' for 5 hours and longer without pressurization, just using oxygen masks. Of course, we were physically qualified to operate at those levels; elderly persons might suffer adverse reactions."

Coleman: "Pressurization and temperature control are now so interconnected that you need pressurization all the time. In military aviation use, through the tremendous number of hours the Air Force jets have piled up, cabin air conditioning must have quite a reliability record."

Col. Love: "Oh, yes."

Pague: *"Norman Beuter, of N.Y. Air Traffic Control, will give us some of his ideas on the handling of mixed conventional and jet aircraft traffic."*

Beuter *(N.Y. ARTC Center):* "We all regard the future of air traffic control in terms of past records. Some say that the present system is inadequate, and will be worse with the introduction of faster aircraft. The present air traffic control system is a good one, and safe, but it must be modernized to keep pace with the rapidly expanding air industry, civil and military. One difficulty has been the lack of funds to improve and expand the Federal Airways System. The CAA is now in a better financial position, and steps are being taken to correct deficiencies. We see the benefits of new equipment and additional personnel in several high-density traffic areas. As for future handling of jets, I see no problem which cannot be solved.

"The films we saw yesterday on the work being done by the Air Force were undoubtedly most revealing to many. The CAA and other agencies are evaluating and developing related tools and procedures. The integration of new ideas and tools into the present system is being accomplished. In traffic control we should have had 10 yrs. ago what we will have 3 yrs. from now. What has been done in the integration of turboprop aircraft in our busiest terminal areas has been quite successful; the jet should present no problem. Military jets have been intergrated with conventional traffic at some of the busiest military bases.

"One item brought up involved a conventional aircraft sitting on the runway with a turboprop or jet taxiing out from the loading ramp and being cleared for immediate take-off. We know that any lengthy delay awaiting clearance to take off, with the engines turning over, is not acceptable to jet aircraft. At LaGuardia or Idlewild today you will hear pilots of conventional powered aircraft say, 'We should be flying a Viscount; we would get off first.' They do not realize that the turboprop has absorbed his share of departure delay at the loading ramp to conserve fuel. To avoid wasting fuel, operators often tow the aircraft away from the gate to make the space available for other flights."

Coleman: "Most business aircraft have to be self-supporting, and usually require an internal APU. This is one way it can be done. Business aviation also made tremendous strides in the use of nickel-cadmium batteries. They practically pioneered them, and use them all the time. With those batteries and an auxiliary power unit you can start and stop without worrying about burning up the batteries. You can even taxi engines off by use of a hydraulic drive on the nose wheel; the APU drives the hydraulic pump."

Beuter: "But at many of our busiest airports, once you taxi into the run-up area at the end of the runway there is insufficient room to permit the controller to change the take-off sequence. This is especially true at LaGuardia; the Port Authority is taking steps to correct it."

Coleman: "You still have the ability to mobile with this hydraulic gear, to taxi into a run-up area, or pull out into another position, engines off."

Beauter: "Our present solution is to have the turboprop aircraft assimilate the departure delay at the loading ramp, taxiing directly to take-off position in his turn."

Col. Love: "That is better than queuing up on a taxi-way and waiting your turn to take off because, with jet aircraft, you can't afford to be behind several prop airplanes and have them throwing rocks in your scoops. In addition, fuel economy is involved. You're drastically whittling off range as long as that jet engine is churning on the ground. The longer you put off starting the engine for take-off, the more flight range you will have."

Herman: "What about bringing these aircraft back in a mixed traffic situation at a hi-density terminal where high-fuel-consumption aircraft are held in a stack?"

Beuter: "Disregarding airport delay, and presuming you have an ILS gate time which can be adjusted 10 or 15 min., fitting into the approach pattern from enroute position is relatively simple. Some speed control must be introduced by the controller to prevent unacceptable closure rate between slow aircraft and fast ones. Currently, with both turboprop and conventional-powered aircraft, we utilize off-set feeder stacks or patterns. This is not the holding pattern with which you are familiar. These off-set feeder stacks are basically transfer points at which the enroute radar controller turns over the control to the terminal radar controller. Assuming that airport capacity and weather minimums do not prevent your landing, the transfer of control at the holding pattern from one radar controller to the other causes no delay; your flight pattern will be uninterrupted from the enroute course to the ILS gate.

"Jets will want to commence their transition from enroute position to landing procedure from a higher altitude and at a greater distance from the ILS. The feeder stacks will be moved far enough from the ILS terminal to permit continual descent at the desired rate onto the ILS. Terminal delay inbound is not in most cases due to inadequate air traffic control system, particularly where we have inaugurated full radar control, but rather to something on the airport or the existence of less than landing minimums."

Gardner: "The turboprop is much less critical of operating height than the pure jet, is more able to face stacking and is less bothered by runway altitude and temperature problems. The only aircraft operated today in the U.S. certificated at 100% temperature accountability is a turboprop."

Herman: "Do present radar facilities permit you to scan these higher-altitude holding points?"

Beuter: "Our enroute radar has a limitation of about 60,000'. Terminal radar usually has a maximum of 8,000', although modification kits can raise this to 20,000'. We think jet operators will want to absorb any delay at relatively high altitudes; this will be under the jurisdiction of the enroute controller."

Col. Love: "Then for the Air Force, the holding pattern over the Podunk fan marker at 4,000' for an hour is a thing of the past in jet operation. Those who operate jet aircraft have to use the most economical way to get down from operational enroute altitudes to the airfields."

Pague: *"How will you handle a scramble operation, getting supersonic jets into the air within minutes after the warning, and returning before fuel is exhausted, in a congested area?"*

Beuter: "We have had this problem since about 1950, in critical areas such as New Castle, Del., which mixes Air Defense with civilian traffic and is very close to Phila. Having been introduced to the Century series fighter aircraft, and realizing that the Air Defense Command is currently replacing old type jets with the new series, I think that our problem of blocked airspace will be reduced. The high performance of these new aircraft will require less reserved airspace. Concerning minimum fuel capabilities, even with present opera-

tional jet fighters, each aircraft is assigned an approach time prior to scramble. Arrival and departure of conventional-type aircraft, such as MATS, gives way to air defense scramble and recovery requirements."

Brown: "Have corporate and airline pilots created many of their own holding problems by continuing into questionable weather areas because they have sufficient fuel on board?"

Beuter: "I wouldn't put that label on the corporate pilot, but airline operation along those lines often creates a problem for the air traffic controller. The larger air carriers have their own forecasters. Various airline forecasters often differ with each other and with the Weather Bureau. When airline operation is predicated on a forecast which misses, the traffic controller has a large number of aircraft holding."

Brown: "Sometimes we have held for a couple of hours at N.Y., although Washington was good, because we had enough fuel and the passengers wanted to get off at LaGuardia. In the jet age we couldn't do that. We would land in Washington."

Beuter: "The air traffic control system will adequately handle the desired volume of aircraft if it is not affected by weather minimums and runway acceptance. Each time an enroute aircraft is unable to land due to weather minimums or inability of the runway to accept that aircraft, the aircraft must hold. Each aircraft holding has a chain reaction throughout the entire airway structure, which eventually places a great strain on the controller and the system."

Brown: "Passengers would rather fly around for 45 min. to land in N.Y. than be diverted to another airport with perhaps a shorter holding. We try to encourage them to go on the ground at Newark or Idlewild, and we'll arrange ground transportation. They would be home sooner that way than if we held and landed at LaGuardia."

Beuter: "There are many complications. After we have diverted flights to alternate airports many of the aircraft are now at the wrong terminal to originate scheduled flights. Ferrying these aircraft to the point of scheduled origin made a difficult traffic problem worse."

Pague: "*What consideration has been given to the fact that more and more jets will come into the picture, and more holding will be required? Landing aircraft will require gates to unload their passengers; if we can't taxi out to the end of the runway and hold as we do now, how do the authorities plan to accommodate holding at gates while waiting for departure clearance?*"

Beuter: "If Mr. Fisher were here he could give first-hand accounts of recent examples of gate and taxi-strip congestion at LaGuardia.

"Departure-wise, if the aircraft can get to the end of the runway there should be no delay in take-off caused by airway congestion. With terminal and enroute radar, the only delay to departure would be an aircraft arriving on the same runway. Our system consists of full radar control from take-off to assigned cruising altitude, with the radar controller providing standard radar separation without regard to altitude. Upon reaching assigned cruising altitude, the controller reverts to the standard altitude and longitudinal separation methods.

"The air traffic controller must have your complete flight plan; the requirement to file such flight plan at least 30 min. in advance is still valid. The necessity for the pilot to repeat, via radio, the clearances issued by the controller is a policy with the airlines and the military, established as a double check on the pilot. It is immaterial to the controller and creates objectionable radio circuit congestion. We believe in using the phrase 'via flight plan route' to reduce channel congestion."

Pague: "*Tom Davis of the CAA will give us some data on their safety planning for the operation of jet aircraft.*"

Davis *(CAA):* "If we knew exactly what we are going to be up against, it would be very simple to write new regulations and apply new operating procedures. Our position is like yours: what little jet experience we do have comes from the Air Force. Consequently, we must sit down with industry, as we have with the manufacturers, and program together on the difficulties we foresee in the building of jet aircraft. We cannot rewrite Part 43 until we know more of the operating difficulties. We know some of them, and we can be thankful that we are going into this gradually. We will learn as you do, and gradually impose the restrictions which seem necessary for the future of safe jet operations.

"The CAA has 3 jets at the Oklahoma City training center, and all our inspectors will be rotated through a jet transitional course, so we *will* have some operational

experience. We have also had, for some time, the jet turbine course at the center for our maintenance inspectors. Our repair stations are now and for some time have been contracting with the Dept. of Defense for overhaul of many of their reciprocating engines and the majority of the accessories. As the repair stations get more and more into jet engine overhaul at the request of the military, we can amass a lot of experience for civilian operators.

"CAA will probably require that jet aircraft be operated with much more attention to the manuals written by the manufacturers and CAA. Runway lengths and temperatures, two critical items in jet operations, will have to be controlled quite closely. I wish we could take Dr. White's recommendation on physiological aids, so we could just look at a pilot and determine his fitness for jet operation. Thus far, our techniques have been satisfactory. We must simply 'grow up' with the industry and take advantage of the best advice available."

Col. Love: "The Air Force has 15 yrs. of jet experience, and we feel responsible for assisting the CAA and civil aviation operators in their preparation for the beginnings of jet flying. We know that the airframe contractors who will design and produce jet executive transports have a terrific amount of know-how because they produce the aircraft we use. Between the Air Force and the airframe industry, we think that you can get off to a safe, well-educated start, free of the hardships attendent on our pioneering."

Pague: *"The multipurpose jet servicing equipment we saw at the Symposium is quite elaborate and heavy duty compared to what we would need for the average business aircraft operation. It is very likely that this type of equipment would be owned or operated by airport management or the fixed base operation. For one to invest in all the multipurpose equipment that we saw at Wright Field, there would be the matter of economics."*

Coleman: "This is where business aviation really differs from airline and Air Force aviation. The airlines and the Air Force have servicing equipment wherever they land, but many service operators can't afford it. Business aircraft must be self-supporting, and this involves such things as integral stair doors and auxiliary power units. It's not an insoluble problem."

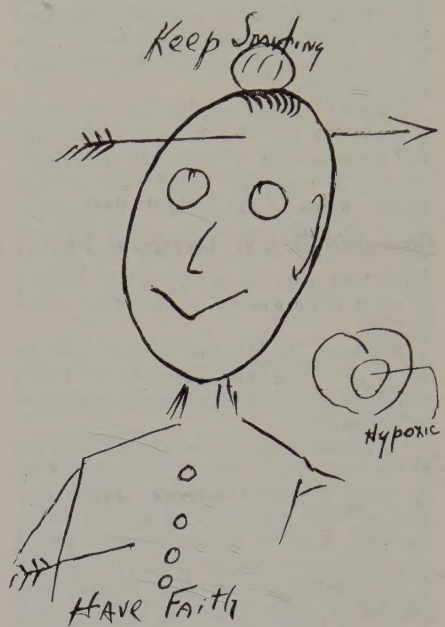
Gordon: "Our experience indicates that a small jet can be completely self-supporting. In our demonstration tour we made 851 flights in 40 cities over a period of 4½ months. Throughout this period the engines were started on the nickel-cadmium battery in the airplane. They required no servicing or charging in this period."

Col. Love: "The equipment you saw was designed for much larger, more complex machines than the executive jet transport will be. For instance, larger engines demand larger APU's. It's also true that your operation must be tailored to the environment in which you use the aircraft."

Coleman: "The airframe manufacturer understands this and is prepared to give the business aircraft anything that will keep it self-sufficient. We are thoroughly planning our turbojet and turboprop aircraft to make them completely self-sustaining."

Gordon: "During the trip with the MS 760 we covered 27 states, and the average direct maintenance man-hours per flight hour was .733. For the last 1½ months this dropped to .431 because of increased experience."

Brown: "The physical size of present airline and Air Force aircraft calls for line or ramp-type maintenance. We would like



SKYWAYS' *custom is to collect all notes and papers after a Round Table. Don't tell Dr. White we have his comforting doodle inspired by this subject.*

to have a high-capacity air compressor, but the business operator knows he can buy a pressure bottle holding 18 or 1900 lbs. pressure to pump up the oleos. Even at our home base, we don't have a compressor for the few times we might use it. It took the corporation to initiate use of the air-stair door. So too with the auxiliary power unit, which corporate aviation picked up from the Air Force. Aviation has come to the point where the weight of an internal power supply for starting and running certain ground equipment will pay off, especially because the difference between take-off gross and the weight of the new units is small."

Turner: "We've had to face the maintenance problem in commercial jet aircraft, and because of our broad interests in aviation we now have 6 aircraft service shops. We do all types of maintenance and overhaul work, and we are currently considering the possibilities of putting in two more to service commercial and military aircraft; I'm sure we'll have the same services in strategic locations for business aircraft."

Pague: *"In the matter of runway limitations in the operation of jet aircraft, we heard of instances when, on a particularly hot day, it isn't a matter of going that day at all, but of waiting for the next day, because there just isn't enough runway length for the aircraft to get off. Jerry Gordon of Beech advised me that they had no trouble with runway limitations during their demonstration of the light jet."*

Gordon: "We operated from 40 different cities, from Calif. to N.Y. and Canada, with no difficulty with runway length or integration with other traffic. The take-off distances measured in accordance with Part 4B requirements are comparable to current transport airplanes."

Gardner: "Runway length requirements for the turboprop are no more than for comparable-sized piston-engine aircraft."

Col. Love: "Almost all Air Force jets have very high wing-loadings, and some have high thrust/weight ratios. Wing loading affects landing and take-off roll distance. When we make a flight plan for a jet flight, we must file computed take-off distance which allows for field elevation, ambient temperature, and gross weight of the plane.

"Executive jet wing loadings will be less than in military jets, but you have the same situation if you want to go into a small field. Computing take-off distance is well worth investigation."

Coleman: "Col. Love, most of your figures were for a rather old and underpowered aircraft. Even in your new-generation 100-series you have these problems. Fairchild has a new concept in a light wing loading non-military load airplane; we have a 4B category airplane. The F-27 and the M-185, as 4B aircraft, must have power recovery, for example, with methanol. Bigger engines, and a good growth factor, is the thinking through both airplanes, stressing the business need and trend, considering altitude, temperature and runway length."

Col. Love: "The system was designed primarily for T-33 operations."

Coleman: "No one who has ever had a few jet flights will underestimate the value of the computer on a jet aircraft. They're still all classified, but it will be important to corporate aircraft, and we're going to furnish one—a simple slip stick; just feed in the problem, and out comes the best climb, descent and cruise."

Davis: "If you build these aircraft under O4B, Part 43 operators are not now required to comply with this regulation. If you use computers the way the air carriers do, you consider runway length and altitude; executive pilots are not controlled by this regulation."

Col. Love: "But they have so much self-control!"

"It's certainly not a 5-min. effort wasted to compute take-off roll. If you go into small fields, even with a smaller jet aircraft with low wing loading and a high thrust/weight ratio, you've got the same problem."

Pague: *"To summarize our discussion, I am sure we all realize that the jet age in Civil Aviation is rapidly approaching. The Air Force has presented invaluable information during the Symposium, and one appreciates the problems that have already been surmounted in learning jet operation. It is also gratifying to hear that the CAA is approaching the problem realistically, as are the aircraft and engine manufacturers.*

"In behalf of Skyways, I wish to thank the participants for sharing their knowledge, that we may publish it for all business aircraft operators."

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New Fire Truck Gives High-Pressure Fog, Carries Own Water Supply

Especially suitable for airport fire protection is a fast, highly maneuverable high-pressure-fog fire truck which carries its own water supply.

The "Little Bean" fire fighter, available from John Bean, has two hose reels equipped with 200′ of special high-pressure hose which provides instant high-pressure fog while the truck is stationary or moving. This is made possible by a transmission power take-off which permits full-pressure operation of the pump (60 gpm at 850 psi) while the truck is in motion.

High-pressure fog is produced by driving water at high pressure through a "gun" that converts it into microscopic particles which simultaneously cool, smother and isolate the fire.

Outstanding body features include more than 60 cu. ft. of weatherproof storage compartments and a full-width non-skid rear platform. The unit can be mounted on most standard 1-ton truck chassis, either 2- or 4-wheel drive.

The 250 gal. water tank is made of copper-bearing 10-gauge steel with corrosion resistant coating. It has a 6″ filler and removable top for easy access. The hose reels are spring loaded and have horizontal and vertical guide rollers for fast hose laying or pick-up.

NU-AVI-QUIP

Devoted to Equipment and Service Needs of Executive Aircraft

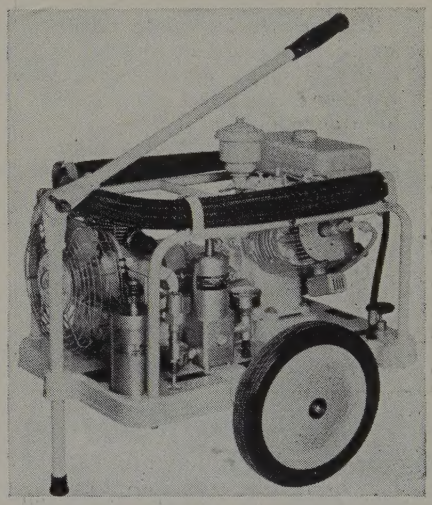
Zippered Plastic Tubing Protects, Color Codes Aircraft Wiring

A new zipper-style plastic tubing, designed primarily to reduce time and labor in the lacing and tying operation of electrical harness assemblies, has Air Force approval for use to enclose, identify and protect multiconductor wiring in aircraft. The easy operation of the new product, called Zippertubing, also permits inexpensive fabrication of custom cabling for experimental use.

The zipper pull-tab used to close Zippertubing is detachable, and the tubing may be "unzipped" and re-used, or permanently sealed with a sealer provided by the manufacturer. When sealed, Zippertubing will withstand a linear strength-test of 30 lb./in. Available in 9 colors, including black and clear, Zippertubing is made of polyvinylchloride plastics which meet specications MIL-I-631V and MIL-I-7444A for aircraft and other types of wiring. It is available from W. A. Plummer Mfg. Co., Los Angeles, in continuous length from 20′ to 1000′.

New Portable Air Compressor

A small portable compressor, ideally suited for servicing landing gear struts, hydraulic accumulators and emergency air storage bottles, utility pneumatic systems and for inflating aircraft tires is being produced by The Cornelius Co., Minneapolis.



The 3-stage air-cooled compressor has a pumping capacity of 2 cfm of free air at 3000 psi discharge pressure. A single adjustment provides any required delivery pressure from zero to 3000 psi. The complete pneumatic system stores 25 cu. ft. of dry compressed air. Power is provided by a Continental heavy-duty 2.5 hp 4-cycle gasoline engine; AC motor drive is optional.

The complete compressor assembly weighs 130 lb. and is very mobile. In addition to the compressor and engine, the assembly includes an oil and moisture separator with ceramic filter, priority valve, relief valve, check valve, 200 cu. in. air storage cylinder, pressure regulator, and 25′ of high-pressure air hose with standard aircraft chuck assembly. Complete performance specifications are available from the manufacturer.

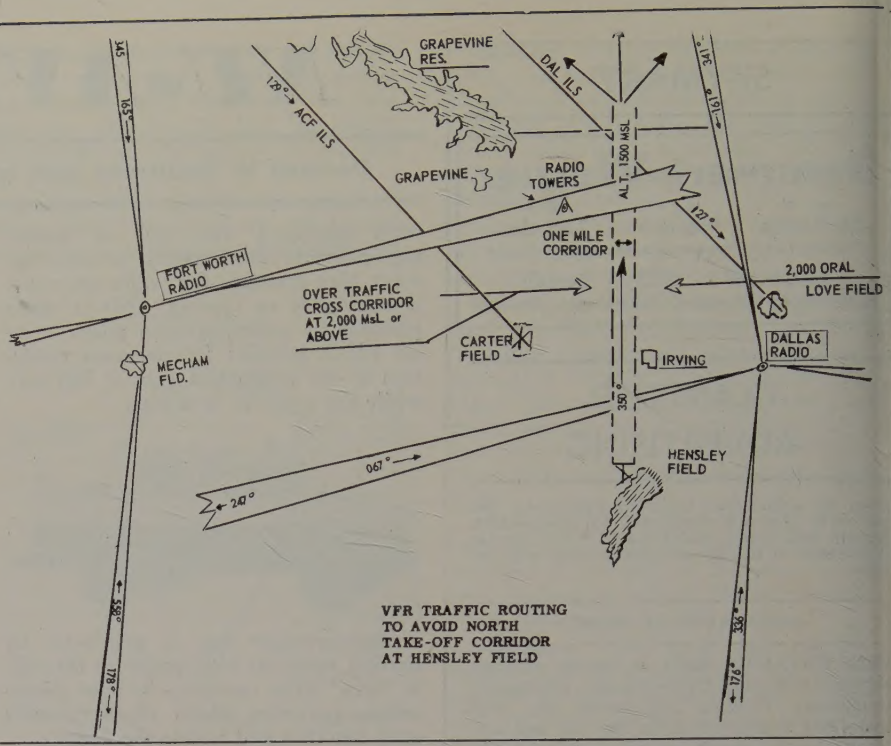
Dallas-Ft. Worth Area Air Traffic Control Revisions

1. When ceilings are at least 2500′ and visibility 5 mi. in the terminal area, and N. take-offs are in use at Hensley, all traffic will cross the Hensley take-off corridor at 2000′ MSL or above. Love, Carter and Meacham Tower will so advise traffic.

2. On northerly take-offs or landings, aircraft crossing the Hensley take-off corridor, arriving or departing Carter or Love Fields, will make left turns in or out.

3. On North take-offs from Hensley Field VFR, jet aircraft will maintain 1500′ MSL and 350° magnetic course until opposite the N. tip of Grapevine Reservoir Dam. Non-jet aircraft will follow the prescribed Hensley Field traffic pattern. Jet aircraft remaining wholly within the Hensley control zone, such as those making touch-and-go landings, are exempt from following the above corridor.

4. When ceiling is below 2500′ or visibility less than 5 mi., jet aircraft departures following the above corridor from Hensley will be coordinated with Carter and Love Towers prior to release.



Lockheed Jet Trainer-Transport Under Construction

Burbank A jet utility trainer transport for use by the armed forces is under construction by Lockheed Aircraft Corp., it has been announced.

Lockheed is building a prototype based on an interest expressed by the military services in a light, fast transport, it was stated.

The prototype of the 2-crew, 10-passenger airplane is scheduled to fly in Sept. '57. Lockheed is developing this aircraft with its own funds.

Aero Design, Bendix, Lycoming Begin Cooperative Engine Program

Aero Design & Engrg. Co. has announced a program of engine and carburetor improvements, undertaken in cooperation with Bendix Products Div. and the Lycoming Div., to provide free of charge to Commander owners refinements in Lycoming GSO 480 engines which are incorporated in current production models.

These improvements consist of specially treated pistons with a hard protective coating to resist the corrosion and intergranular activity resulting from the use of high-octane fuels. The exhaust valves have Nichrome heads, making them more resistant to erosion than previously used valves.

At the same time the carburetors are to be removed and sent to the nearest Bendix distributor or authorized overhaul station for installation of new vinyl coated diaphragms and improved throttle shaft and bushings. The automatic mixture control will be inspected, and if it is not of the current type it will be replaced. The fuel flow will be adjusted to the flow rate specified by engine, carburetor and aircraft manufacturers.

Aero design and Lycoming representatives will be on hand to inspect all phases of engine installation. The services are to be performed by the distributor from whom the Commander was originally purchased. The program is to begin at once, and is to be conducted without charge to the Commander owner.

Designer Fred Weick to Head Piper's New Florida Development Center

Fred E. Weick, well-known aircraft designer and aeronautical engineer, has been named Director of the recently announced Piper Aircraft Development Center at Vero Beach, Fla.

Weick will direct research and development of new Piper Aircraft at the new development center, where work will start shortly on the construction of an air-conditioned building to accommodate the special new staff of engineers and experimental department personnel recruited at Vero Beach Municipal Airport. Former Navy facilities at the airport, which has 6 runways, including one 7500′ long, will be used temporarily until the new building is completed.

Best known for his development of the Ercoupe, Weick was active at the Aircraft Research Center of Texas A & M, working on the development of agricultural aircraft (including the AG-1 and AG-3), dispersal equipment and measurement of spray and dust patterns.

An experienced pilot, Weick soloed in 1923, and subsequently served with NACA, Navy Bureau of Aeronautics and Hamilton Aero Mfg. Co. as propeller design and research engineer.

Airnav Facilities Operate With High Degree of Reliability

The major air navigation facilities of the CAA have a reliability record of "on the air" 98.3% of the time, according to James T. Pyle, CAA Administrator.

The more than 1400 facilities actually average 99.8% reliable except for planned outages for maintenance, since the *unanticipated* outages average only .2%.

The remaining 1.5% of total outage is on a scheduled basis for such purposes as preventive maintenance, modernization, relocation, and flight checking following modernization or relocation.

These facilities include surveillance and precision approach radar, instrument landing systems, VHF omnidirectional radio ranges, low and medium frequency radio ranges, distance measuring equipment, fan markers and H facilities.

Illinois Offering 180° Course

Ill. Dept. of Aeronautics continues to offer its 180° course to airport operators or their designated instructors at no charge under the Dept. "Chain Reaction Plan."

Under the provisions of the "Chain Reaction Plan" the Dept. will give the 180° course to any properly qualified airport operator or his instructor under a gentleman's agreement that that person will in turn pass along the 180° course to one other person at no charge before making a charge for the course. That person in turn will do the same, and so on down the line.

Any operator who wishes to take the 180° course under this plan should submit his request to the Dept. in writing and one of the Dept. safety reps. will make arrangements to give the course as soon as possible.